AN HBJ PUBLICATION

March 1983/$2.00

WEEDS TREES & TURF

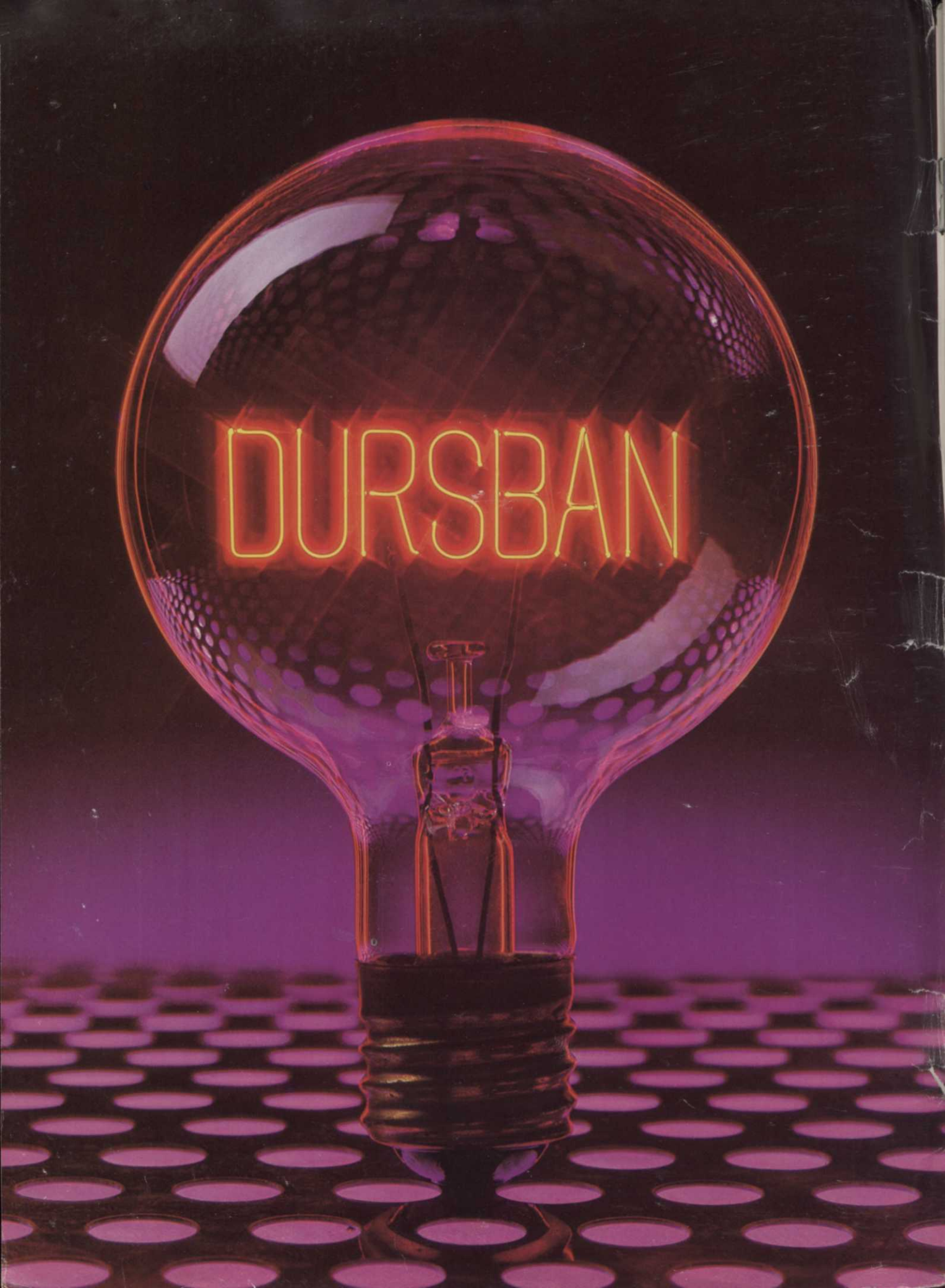
The Journal of Landscape and Golf Course Design, Construction and Care Since 1962

The Little Golf Course

Northbrook Parks Overhaul Athletic Fields

1983 Weed Control Guide

Overseeding soccer field in Northbrook, IL.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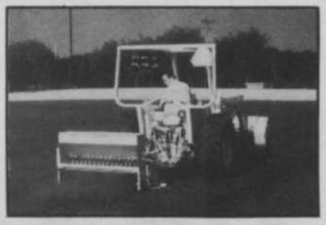


Cover: The park system staff in Northbrook, IL, gives taxpayers what they want, good fields for its soccer program. See page 24.

MARCH 1983/VOL. 22, NO. 3

22

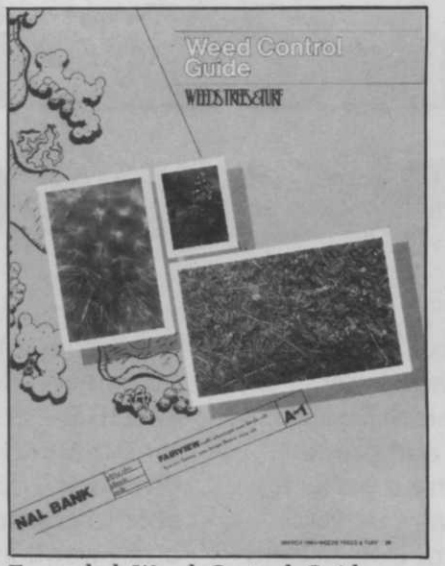
Landscape Log: April Jobs for Your Crew

Insect control, transplanting and fertilization head the list for April. April is a good time to beat the insect before it gets established says Doug Chapman.

24

Serious Soccer: Northbrook Commits To Quality Fields

Northbrook, IL, takes soccer seriously and its park staff responded with a five-year program to improve fields. Mike Schiller's program includes frequent aerification, bulk fertilization, and overseeding. Schiller has moderated costs with labor and cost cutting techniques.



Expanded Weed Control Guide, see page 29

29

1983 WEED CONTROL GUIDE

This annual field guide has been updated to include more landscape and warm season weed control information. Drs. Euel Coats and Elton Smith are the authors of this 48-page helper. Illustrations by O.M. Scotts and a Weed Quiz round out the Guide. Keep this valuable reference to answer questions this spring and summer.

78

Let's Not Forget Little Golf Courses

Veteran superintendent Bill Lyons defends the importance of small golf courses to the game. He points out their special needs and questions whether they receive the support they deserve.

Efficient soccer field management, see page 24

DEPARTMENTS

Outlook ____ 6
Green Industry News ____ 8
Golf Update ____ 11
Landscape Update ____ 14
Government Update ____ 16
Landscape Log ____ 22
Vegetation Management ____ 88
Letters ____ 89
Events ____ 100
Products ____ 102
Book Review ____ 104
Classifieds ____ 106
Advertiser Information ____ 108

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turf-type perennial ryegrass

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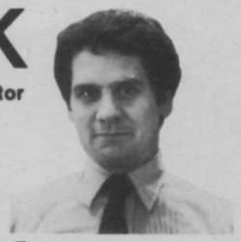
OUTLOOK

By Bruce F. Shank, Executive Editor



The time is now to coordinate educators with our industry

The landscape business and the U.S. political machine have simultaneously recognized a need to improve our educational system.

In his State of the Union Address, President Reagan proposed a four-part package of educational incentives. The two parts of importance to the landscape and golf market are a program to improve math and science training and an Internal Revenue Service income deduction for educational savings accounts.

At the same time, the Associated Landscape Contractors of America has created a $25,000 fund to help two- and four-year colleges establish landscape curricula. The program will build from a successful program in existence at Mississippi State University. The program will extend to high schools to show students the opportunities in landscape contracting.

A third consideration might be increased recognition of the needs of agriculture. Most horticulture programs fall into the agricultural curricula of colleges and Land Grant universities. Agricultural colleges may benefit from this new awareness.

The stage is set for a major improvement in educational channels for the landscape and golf industries. Industry should coordinate its needs with current educators to take maximum advantage of this unique opportunity.

Agricultural extension agents have an association, but horticulture and agronomy for turf and landscape play a minor role in it. An organization of educators and extension agents in horticulture and agronomy for turf and landscape would be very helpful, not only to the programs run by the educators, but to the industry as it tries to coordinate with educators.

If the major industry associations worked together with a new association of turf and landscape educators, the full potential of educational support programs could be realized.

To this end, *Weeds Trees & Turf* offers to act as a communications center to help educators and industry associations coordinate their efforts. I invite turf and landscape educators and extension agents interested in this plan to contact me at 7500 Old Oak Blvd., Middleburg Heights, OH 44130. In turn, I will try to find and contact you and work with principals at our industry associations.

The opportunity exists. We have to make sure we take advantage of it now. **WTT**

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OFFICES

ATLANTA
3091 Maple Drive
Maple Center One Building
Atlanta, GA 30305
(404) 233-1817

CLEVELAND
7500 Old Oak Boulevard
Cleveland, OH 44130
Editorial: (216) 243-8100

CHICAGO
111 East Wacker Drive
Chicago, IL 60601
(312) 938-2344

SEATTLE
1333 N.W. Norcross
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Up there on the left is the L235, ideal for all grounds maintenance chores.

While hard at work down on the farm is the L275.

Both tractors have water-cooled diesel engines.

The L235 gives you 23.5 hp;* while the L275 with live rear PTO produces 27.5 hp.*

And both tractors have standard features that include rear wet disc brakes, a 3-point Category I hitch and a 7.4 gallon fuel tank.

Whether you have 2- or 4-wheel drive, power steering is up to you.

Any of the dealers in our nationwide sales and service network will certainly help you decide.

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With products like the L235 and the L275, you'll agree we're a company that's going forwards.

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*Gross engine hp manufacturer's estimate.

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GREEN INDUSTRY NEWS

Contractors shift emphasis to management

The Associated Landscape Contractors of America's new emphasis on management was evident at its annual meeting in Miami in January. Delegates from the interior and construction sessions were seen slipping into the management sessions as the meeting progressed. The thirst for management discussion was clear.

Ron Kujawa updates ALCA *conference on its new Landscape Management Division which he chairs. Seated at podium are (left to right) president elect Rod Bailey, 1983 president Dave Pinkus, former president Ray Gustin, 1984 convention chairman Irv Dickson, and secretary Karl Korstad.*

Ron Kujawa, head of the Landscape Management Division, told the general session the Second Landscape Management Seminar will take place this November in Denver and he expects the attendance to double or triple from the 300 at the original seminar in Dallas in 1982.

Two elements add to ALCA's management emphasis, a program to encourage educational institutions to develop landscape curricula and a book to be published this fall, *Cost Effective Landscape Management.* Mississippi State University's Bob Calloway and Joe Marsh formerly with Environmental Industries will visit two- and four-year schools with other contractors to encourage development of a landscape management curricula.

Dues savings to locals

After December 31, 1983, member firms of state and local landscape organizations may become members of ALCA for $100, according to a new

Continued on page 10

HORTICULTURE

Sea World names new horticulturist

Susan Dietz has been promoted to horticulturist at Sea World, San Diego, CA. Dietz will supervise the park's staff of 27 gardeners which maintains 40 acres of landscaping containing 1,700 species of plants

Susan Dietz

Dietz came to Sea World as lead gardener in August, 1979. In February, 1982, she was promoted to assistant horticulturist, working under Chuck Kline, Sea World's horticulturist since 1972. Kline will continue at Sea World as horticultural consultant.

A graduate of San Diego State University, Dietz has worked with the San Diego County Agriculture Department as agricultural technician. While there, she developed an interest in the biological control of insects which she plans to pursue at Sea World. She is a member of the American Association of Botanical Gardens and Arboreta, the American Horticultural Society, the California Native Plant Society, the Nature Conservancy and the Quail Botanical Gardens Foundation.

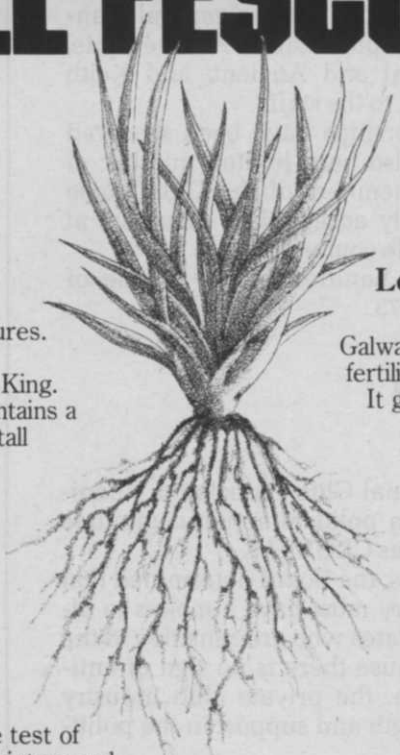
SEED

Glattly joins Ampac Seed Co.

John Glattly has been named marketing and sales manager for Ampac Seed Co. of Tangent, OR. Glattly comes to Ampac from Great Western Seed Company of Albany, OR, a subsidiary of Lofts Seed Company of Boundbrook, NJ. Prior to that, he was sales manager of Whitney Dickinson Seed Company of Buffalo, NY, a subsidiary of Stanford Seed Company.

Ampac Seed Co. supplies many Northwestern-grown public varieties of seed as well as being active in contract production of proprietary varieties for companies in Oregon and nationwide. The company also produces varieties for export, particularly to Japan.

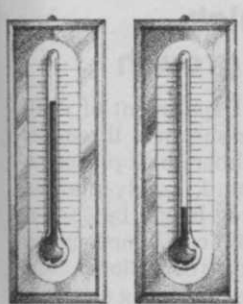
NORTHRUP KING'S GALWAY WILL CHANGE YOUR THINKING ABOUT TALL FESCUES.



Until now, most tall fescues have come up short.

They've failed under extreme temperatures. And fallen victim to disease.

But now there's Galway from Northrup King. A versatile, fine-leafed tall fescue that maintains a dense weed-free turf years after ordinary tall fescues thin out.



Improved performance against disease and extreme temperature.

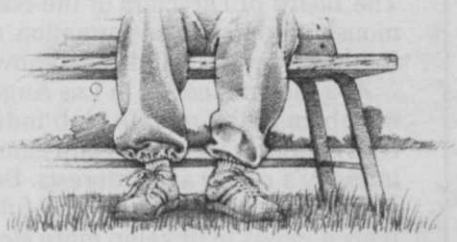
In development, Galway passed the test of fierce Minnesota winters and sweltering Midsouth summers.

It passed the test at several northern and southern universities, too, ranking among the best turf-type tall fescues available.

Tests have shown that it won't succumb to brown patch or net blotch. And that its improved shade tolerance makes it well suited for use under trees and in other low-light areas.

Low maintenance turf with a high maintenance look.

Galway requires only limited amounts of water and fertilizer to produce an attractive, dark green turf. It grows slower, which means less mowing. And its improved fine-leafed texture improves density and uniformity.



It is recommended for athletic fields, parks, playgrounds, commercial and public turf areas, boulevards, embankments and home lawns. New, fine-leafed Galway from Northrup King. It'll change your thinking. Because, in the world of tall fescues, it stands above them all.

Ask your Northrup King distributor about Galway tall fescue. Or write Northrup King Medalist Turf Products, P.O. Box 959, Minneapolis, MN 55440.

MEDALIST TURF PRODUCTS

NK NORTHRUP KING

Circle No. 143 on Reader Inquiry Card

GOLF UPDATE

St. Andrews seeks U.S. golfers

British businessman Frank Sheridan has invested $20 million in a golf and country club development at St. Andrews, Scotland.

The investment will convert the world-famous Old Course Hotel into the Old Course Country Golf Club, sporting the latest in golf and relaxation activities.

Sheridan toured a number of clubs across the U.S. to determine what factors would be most appealing to American golfers.

The Old Course Country Golf Club is immediately adjacent to the 17th fairway of the Old Course and is surrounded by the New Course, The Jubilee and The Eden. Scotland, the birthplace of golf, has numerous courses and 12 that are in the immediate vicinity of the Old Course Country Golf Club facilities. Balconied, double rooms overlook the Old and New Courses, the sea, the Royal and Ancient historical building and the town of St. Andrews. Locker rooms, saunas, indoor swimming pool, jacuzzi, turkish room, massage, solarium, pro and gift shops and a variety of bars and restaurants are also planned.

Sheridan has named James Bannatyne, former general manager of the Glen Eagles golf hotel complex, Laurie Auchterlonie, honorary professional of The Royal and Ancient; and Keith Mackie, golf journalist and promoter, to the staff.

Three hundred corporate memberships have been reserved for the United States. There will also be a limited number of individual memberships. Charter members of the Old Course Country Golf Club are automatically accepted as members at La Manga in southern Spain, a 36-hole course.

Membership inquiries are being handled by the House of Roche, Inc. Hartford, CT (203) 247-2973.

NCA forms political action committee

The Board of Directors of the National Club Association unanimously endorsed the formation of a political action committee for the private club industry, known as CLUBPAK.

At a recent meeting in Los Angeles, the Board determined that members of the private club industry must have a means to directly support legislators and candidates who are sensitive to the industry's needs and interests. Because there is no sign of anti-club pressures easing in the future, the private club industry feels it needs to develop more strength and support in the political arena.

A spokesman for the NCA said the purpose of CLUBPAC is to allow individual members of private clubs to pool their contributions to support their common goals. These combined resources will then be used to support the campaigns of candidates in tune with the rights and interests of the private club community.

The board of directors chosen to administer CLUBPAC includes NCA Executive Director Gerard F. Hurley, Chairman, NCA Vice President Joseph N. Noll, Treasurer; CLUBPAC directors - NCA President Harold B. Berman; Secretary John J. McEnerney; Treasurer E. Guenter Skole, CCM; Past President Herbert L. Emanuelson, Jr. and Past President and Special Counsel Milton E. Meyer Jr.

NEWS *from page 8*

membership policy approved by the Executive Board during the meeting.

If regional associations vote to become "sponsoring associations" of ALCA, each member will receive all ALCA benefits. Many contractors are currently members of both ALCA and local associations. "This change in policy will save these contractors hundreds of dollars," says ALCA president Dave Pinkus.

Former ALCA president Ray Gustin said ALCA's current membership of 1,000 could grow to 4,000 if most major regional associations participate.

"A number of organizations have already agreed to the plan. All that remains is detail work like bylaws, to put the program in place," says Pinkus. "That is the reason for the Jan. 1, 1984 effective date."

"Much of the groundwork for this change was done by Bill Thorton and his Bylaw Committee," says Pinkus.

Smith resigns

The ALCA Executive Board also accepted the resignation of Executive Director Allen Smith during the annual business meeting. Pinkus said this development was not related to the new membership policy. Gail Morgan will act as interim executive director while ALCA carries out "an extensive search" for a new director. Smith replaced John Shaw who resigned within the past year.

"Allen Smith got the ALCA staff organized and functioning effectively," said Pinkus. "No programs or services will be affected by the change."

TREES

Rubber mulch stimulates growth

A United States Department of Agriculture study has shown a three-foot diameter butyl rubber sheet placed on the ground around newly-planted trees increased tree height by 56 percent under dry land conditions and by 40 percent under drip conditions.

Deciduous trees, including ash, Chinese elm, hackberry and honey locust grew more than twice as fast with the rubber mulch than these same species without the mulch. Conifers, including Colorado blue spruce, Rocky Mountain juniper and ponderosa pine, showed a six percent growth advantage with the mulch. Shrubs, including plum, sand cherry and cotoneaster, grew nine percent faster with the rubber mulch.

The study was done by USDA agri-

Continued on page 14

The most versatile little diesels this side of the city limits.

International® 200 Series tractors are as much at home in the city park as they are on the farm. And with all the attachments that are available, they're every bit as versatile. Whether the job is mowing grass, throwing snow, hauling sod, or pulling a sprayer, a 200 Series tractor gives you all the power you need. And more agility than you'd ever expect.

These aren't your everyday small tractors. One quick look at the lighted instrument panel will tell you that. The tachometer and hour meter are standard equipment. So are the live hydraulics and the 3-point hitch. No other tractor in the 15.2 to 27 PTO hp class comes close to matching all the standard features that are yours with the International 200 Series.

The 200 Series tractors are positive proof that International quality comes in all sizes. And when a tractor is as versatile and reliable as each of these, why keep it down on the farm?

Tractor	PTO HP*
234	15.2
244	18
254	21
284	27

Available in 2 WD or AWD.
*Manufacturer's Estimate

A real feel for the work you do.

INTERNATIONAL HARVESTER

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If you think you've seen late-germinating crabgrass in your turf, you may really have been looking at a goosegrass problem.

Either way, you can solve the problem with CHIPCO® RONSTAR® herbicide.

THE DIFFERENCE BETWEEN CRABGRASS AND GOOSEGRASS.

Goosegrass is more common than you might think. It's easily mistaken for crabgrass, especially when it's mowed.

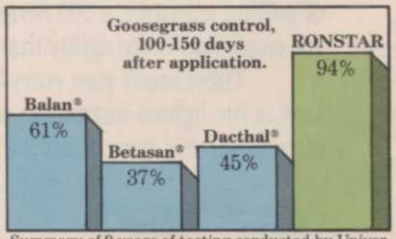
What's the difference? Check the color first. Goosegrass is a darker green. And it always grows in tufts. Crabgrass doesn't.

There's another important difference: goosegrass is much harder to control. Unless you use RONSTAR.

CRABGRASS OR GOOSEGRASS... IT MAKES NO DIFFERENCE WITH RONSTAR G.

RONSTAR is the only herbicide you can count on for effective preemergent control of both crabgrass and goosegrass.

While other products will give you satisfactory performance on crabgrass, they don't even come close to RONSTAR on goosegrass. Years of testing prove it:



Summary of 9 years of testing conducted by University Experiment Station and Rhône-Poulenc personnel.

So you have two choices. Use an ordinary crabgrass herbicide

and hope crabgrass is your only problem.

Or play it safe and use RONSTAR this season, for excellent, season-long control of both crabgrass and goosegrass.

NO RAIN-OUTS, ROOT PRUNING OR PROBLEMS WITH PLANTINGS.

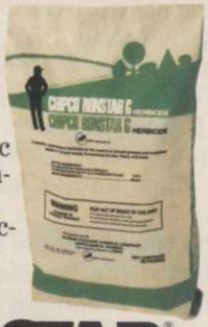
RONSTAR is the most convenient herbicide for your turf care program. It won't leach, so you can fit it into your schedule earlier. It's highly selective, causing no root pruning in perennial bluegrass, perennial ryegrass and bermudagrass, no harm to ornamental plantings or trees.

QUALITY CHIPCO TURF CARE IS THE "RIGHT APPROACH."

Wherever the professionals really care for turf—and especially where both crabgrass and goosegrass are problems—word is getting around. CHIPCO RONSTAR herbicide is your best choice for effective, convenient, long-lasting control.

For more information on RONSTAR or other CHIPCO turf care products, ask your CHIPCO distributor.

Rhône-Poulenc Inc., Agrochemical Division, Monmouth Junction, NJ 08852.



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LANDSCAPE UPDATE

ALCA offers marketing help

The Associated Landscape Contractors of America has developed a new marketing package designed specifically for the exterior maintenance contractor. The package allows maintenance contractors to take advantage of two types of professional selling tools to enhance his business and services. Three mailers are available, designed to look like greeting cards and with a place to insert a business card. They are priced as low as 20 cents each.

The second part of the marketing package includes a brochure that can be sent as a follow-up to those who respond to the mailers or to those who have otherwise expressed an interest in maintenance services. Color photographs will depict results that are possible by using a professional landscape manager. It will also offer ideas on how to select a professional maintenance contractor, and the advantages of using professional rather than in-house maintenance. In addition to presenting the marketing concept, the brochure has been designed to include specific services offered by the individual maintenance contractor. A pocket in the back of the brochure can hold company literature, required bid information and a business card. For more information, contact ALCA, 1750 Old Meadow Road, McLean, VA 22102 (703) 821-8611.

CLCA honors 45 for outstanding work

Forty-five Trophy Awards in 21 residential and commercial categories were presented by the California Landscape Contractors Association to landscape professionals throughout California for the most outstanding work of 1982.

Winners in the 27th Annual Trophy Awards are:

The Sweepstakes Award, the highest honor presented by the CLCA for excellence in landscaping went to Art Torres Landscaping, Inc. of Encinitas for the Chantemar models in San Diego. Project was designed by Land Concern, Ltd. of Santa Ana.

The President's Trophy, presented for the best residential landscaping project of the year — Zierden Waterfalls of Sacramento for the Beneto residence in Carmichael. Designer was Dennis Tromburg of Sacramento.

For the entry judged best in all commercial categories, the Jere Driscoll Award went to Cagwin & Dorward of San Rafael for Santa Rosa Plaza in Santa Rosa. It was designed by Lawrence Reed Moline of Santa Monica.

The Excelsior Award, which recognizes special talent in any category by a new CLCA member, was won by Friesen Landscape of Fresno for the Arnst residence in Kingsburg. Tim Friesen was the designer.

The Judges Award, which salutes the best residential landscaping under $25,000 went to Cal-Tropic Landscape, Inc. of Rancho Palos Verdes for the Cooper residence in Rolling Hills Estates.

For the use of unique methods or materials and/or special artistic effects, the Special Effects Award was given to Pacific Water Art of Mountain View for Orchard Technology Park in San Jose. The job was designed by Singer & Hodges of Oakland.

The Ben Slade Memorial Award for best overall landscape maintenance was presented to M.C. Landscape Care of Reseda for the Bellfield residence in Encino. Designer was Warner Ristau of Granada Hills.

Continued on page 84

NEWS *from page 10*

cultural engineer Rome H. Mickelson at the USDA's Agricultural Research Service, Central Great Plains Research Station, Akron, CO. Mickelson measured growth differences two years after trees were planted and average heights of trees in the study were from 10 to 20 inches.

"The rubber mulch, placed to prevent runoff, improves water use efficiency by reducing water evaporation from the soil surface and preventing growth of undesirable vegetation," says Mickelson.

After two years of growth, trees and shrubs with the rubber mulch were not significantly influenced by the addition of one, three, five or seven gallons of water per week per tree supplied with the drip irrigation system. Without the mulch, the addition of water increased tree growth 40 percent compared with non-irrigated trees.

HORTICULTURE

HRI book stresses nurseryman's viewpoint

A new publication from the Horticultural Research Institute can benefit everyone in the industry, according to its reviewer, Ray Brush, director of technical services of the American Association of Nurserymen.

"A Research Summary of the Census of Horticultural Specialties" details industry trends and gives an analytical review of nursery and floral industry statistics from 1949 to 1979.

"This publication is written from a nurseryman's point of view and gives all segments of the industry a pulse of what's going on," Brush said. Even though certain sections, such as the statistics on production, will have a more immediate effect, in this case on producers, they still have definite bearing on the landscape and retail segments of the industry, according to Brush.

"The statistics would be helpful in these two segments in planning ahead," he says.

Future production and market planning are two areas the book's author, David E. Stump, retired president of the Jackson & Perkins Co. of Medford, OR, addresses.

In the first section, the study begins with a summary of the data. Then, through tables and narrative, the second section provides the details regarding the sales of horticultural commodities which have proven popular

Continued on page 16

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Circle No. 159 on Reader Inquiry Card

GOVERNMENT UPDATE

Reagan highlights agriculture, education in State of Union

President Reagan emphasized the needs of the U.S. educational system and agribusiness during his third State of the Union Address in January. The Green Industry stands to benefit from any program designed to help agriculture or education, especially math and science training highlighted by Reagan in his address.

Reagan clearly sees retraining as part of economic recovery. He wants to encourage growth industries and industries with export potential. Agriculture and high technology industries should be receiving national support according to Reagan.

The President also reemphasized Federalism, the return of government functions to the states. Unemployment has caused states to cut back on many programs because of falling income tax revenues. But Reagan claimed "America is on the mend . . . but recovery won't come in a short, sharp spurt."

Subsidization of math and science education and an income tax deduction for college savings were two of Reagan's four points to help education. Since he stressed agriculture in addition to science, an increase in Federal funding to Land Grant Universities for agricultural programs could result. Horticulture and agronomy could benefit from such funding.

AAN lobbyist Donahue recovers from minor stroke

Leo Donahue, government affairs director for the American Association of Nurserymen, suffered a minor stroke during the Kentucky Nurserymen's Association Meeting in Louisville in January. He was transfered to Bethesda Naval Hospital and doctors report they expect a nearly complete recovery. Ray Brush, director of the National Landscape Association, said they expect Donahue back at his desk within the next few weeks.

Research to net new labels

Five representatives of the interregional research project #4 (IR-4) recently met at the AAN office to update AAN and the Society of American Florists staff on research under way to obtain data for registering pesticides for nursery and florist uses. Drs. Guest and Biehn (IR-4 headquarters), Rutgers University, Powell (Plant Pathology, Ohio State University), Lindquist, (Entomology, Ohio Agricultural Research Center), and Frank (Weed Control Research USDA-ARS) responded to added AAN/SAF requests for registration needs and said that most had been anticipated and research has already begun.

Migrant worker act signed

The Migrant and Seasonal Agricultural Worker Protection Act was signed into law by President Reagan in January. The Act repeals the Farm Labor Contractor Act which put unnecessary paperwork and enforcement requirements on employers of seasonal and migrant labor. AAN lobbied for the repeal of the Farm Labor Contractor Act with other organizations.

NEWS *from page 14*

over the past 30 years, including potted flowering plants, cut flowers, unfinished stock, cultivated greens, bedding plants, foliage plants, sod, bulbs, corms or rhizomes, cultivated mushrooms, nursery products and vegetable and flower seeds.

"Throughout the book, the author concentrates on basic, fundamental information that would benefit anyone in the industry," Brush says.

The book outlines developing profit-boosting strategies for nursery businesses as well as informative educational material for educators and students.

"A Research Summary of the Census of Horticultural Specialties" is available for $10 per copy ($7.50 for educators and students) from the Horticultural Research Institute, 230 Southern Building, Washington, D.C. 20005. The book is free on request to HRI contributors.

GOLF

Columbia Car names new executive

Donald V. Conway has joined Columbia Car Corporation as executive vice president. Conway was formerly executive vice president of Rayovac Corporation in Madison, WI. Columbia's president and Chief Executive Officer Joseph Noll said Conway would share responsibilities for all the firm's operations.

"With Columbia Car's plans for developing new products and new markets, we will look to Don to direct this expansion," Noll said.

Columbia Car, a golf car manufacturer, has new manufacturing facilities in Deerfield, WI. Columbia Management bought the golf car division of the Harley-Davidson Corporation in Milwaukee and moved the manufacturing operation from Pennsylvania to Deerfield.

HORTICULTURE

Amfac names Kemp to director's post

John W. Kemp of San Francisco has been nemed director of strategic planning for Amfac, Inc.'s Horticulture Group.

Previously, Kemp, 40, had been manager of strategic planning for Xerox Corporation in Greenwich, CT. In his new position, Kemp will be re-

Continued on page 19

sponsible for planning and new business development. He holds an MBA from Harvard University's Graduate School of Business Administration and a BS degree from Michigan State University.

Amfac's Horticulture Group includes wholesale nursery, mail order seed and tropical fruit products operations. Amfac, Inc., is a diversified, NYSE-listed company with principal activities in horticulture, wholesale distribution, food processing, hotels and resorts, retail and Hawaiian sugar and land. Revenues in 1981 were $2.1 billion.

IRRIGATION

Hodas assumes Irrigation presidency

Ernie Hodas of Century Supply Corporation, Madison Heights, MI, has assumed the presidency of The Irrigation Association. He was named at the Association's 33rd Annual Convention held recently in Walt Disney World, FL. Hodas is president of Century, which distributes irrigation equipment for both the turf/landscape and agricultural markets. Hodas becomes the 25th president of the 43-year-old organization.

Claude C. Laval III, has been named president-elect for 1983. He is president of the Claude Laval Corporation, Fresno, CA, and will automatically assume the presidency in 1983. Other positions filled were:

-Charles S. Putnam, vice president; of Weather-matic Sprinkler Division of Telsco Industries of Dallas, TX.

-Raymon A. York, treasurer; he is president of Ewing Irrigation Products of San Leandro, CA.

-Elected as directors for three-year terms are Orlando DiRienzo, Manager of Irrigation Sales for Paige Electric Corporation of Union, NJ; John Riddering, president of Agrifim Irrigation Inc. of Fresno, CA; and Lonny Sumers, president of Irrigation Systems of Texas Inc.

Next year the Irrigation Association will combine its convention activities with the Agri-Turf Irrigation Exposition and Conference, scheduled for Dec. 4-7 1983 in Denver, CO.

The Irrigation Association is a world-wide organization of more than 900 members, representing manufacturers, distributors, contractors, consultants and university and government personnel interested in all phases of irrigation for agriculture and the landscape.

CHEMICALS

Granular Oxamyl is registered

According to Dr. Richard Lindquist, Extension Entomologist at the Ohio Agricultural Research and Development Center, another new insecticide, Oxamyl 10 percent granular, has recently received registration. This is the same active ingredient contained in Vydate, only in granular form.

Oxamyl is registered for use in greenhouses for control of many insect pests, including fungus gnats (adults and larvae) leafminers, mealy bugs, mites, scales, thrips, whitefly and nematodes. The host plant list is extensive and growers should see the label for specifics.

The registration application techniques include pre-plant soil incorporation, post plant soil application, fol-

Continued on page 20

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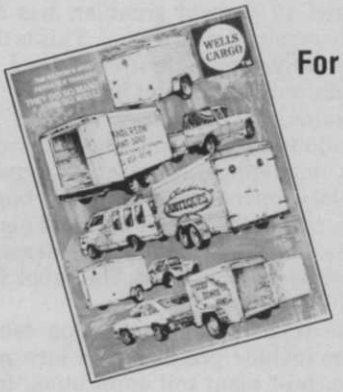

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Circle No. 167 on Reader Inquiry Card

NEWS *from page 19*

lowed by irrigation and incorporation into artificial growing media prior to planting. It is registered for professional use in greenhouses, nurseries and interior plantscaping.

Oxamyl is distributed and sold by the Pratt-Gabriel Division, Miller Chemical and Fertilizer Corporation, Hanover, PA 17331.

TURF

Sewage sludge used as fertilizer

According to C. Edward Clapp, USDA research chemist and Donald B. White, University of Minnesota Professor of Horticultural Science, fertilizing turf grasses with sewage sludge provides a way to use valuable waste material and avoid the potential hazard of trace metal contamination of food crops.

Working on experimental grass plots near the University of Minnesota, St, Paul, over a six year period, Clapp and White applied digested sewage sludge in liquid and dry form and compared the results with grass plots treated with commercial ammonium nitrate fertilizer each year.

In your efforts to grow grass, do you find yourself grasping at straws?

Hydro Mulch® Fibers offer a more efficient seeding method than straw.

And there are several good reasons why. Straw mulching is no longer such a "low cost" seeding system. Not in most of today's projects. Too much time is spent in multiple application steps. And straw is difficult to apply. Even in a moderate breeze, it can blow away, during application, and after application—before any tackifier is laid down. As a result, straw spreads unevenly, leaving areas unprotected.

Hydraulic mulching with Hydro Mulch® fibers is an alternative that keeps your total installed costs down. A one step turf establishment process that works. On every type of terrain. And the seeded area will sprout the kind of good results you demand from a mulch.

For complete information on hydraulic mulching with Hydro Mulch® fibers, contact Conwed Corporation, Fibers Division, P.O. Box 43237, St. Paul, MN 55164-0237, or phone (612) 221-1190.

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Circle No. 110 on Reader Inquiry Card

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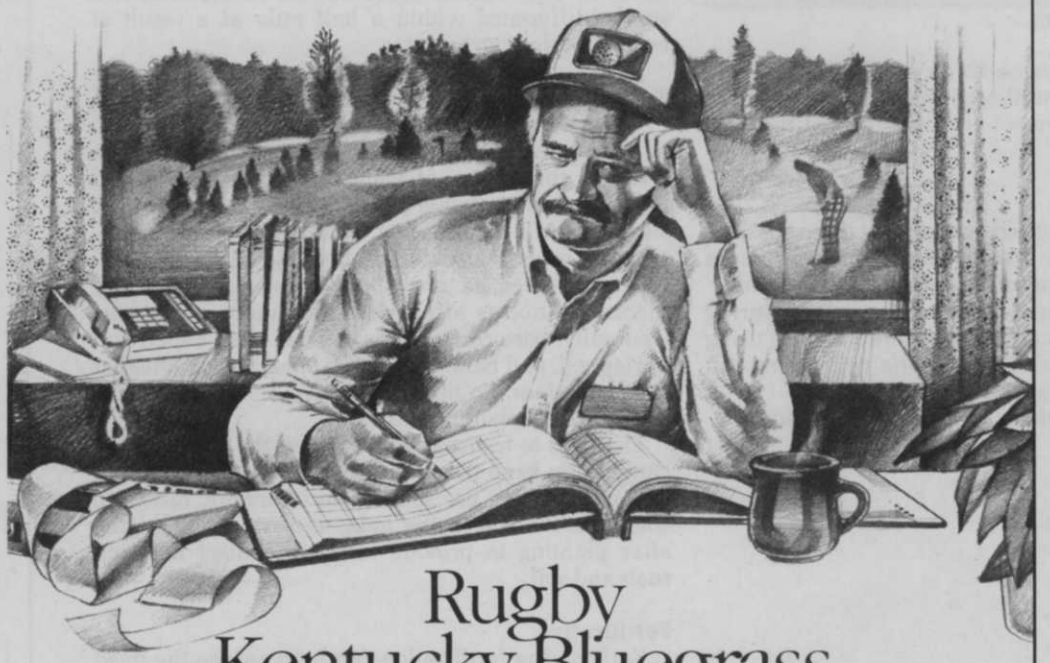

Rugby Kentucky Bluegrass grows rich on a lean budget.

Growing rich, green turf in today's economy is akin to being between a rock and a hard place.

Most Kentucky bluegrasses demand their fair share of nitrogen and water. But nitrogen and water, like the time needed to apply them, are money. And money is tight.

Fortunately, Rugby Kentucky Bluegrass is not like most bluegrasses. It's designed to get by on less.

In test plots grown in diverse climates from Manitoba to Oklahoma and California to Virginia, Rugby demonstrated superior tolerance to environmental stresses. Its most notable attribute, however, is its ability to thrive on *little or no nitrogen* and *moderate moisture.*

In addition to saving the costs of time and materials involved in watering and fertilizing, Rugby's environmental tolerance means extra vigor in resisting disease.

In overall tests, Rugby scored above 29 other Kentucky bluegrasses in resistance to *Fusarium blight,* and was second highest in resistance to leafspot. It has also shown good ability to avoid the perils of powdery mildew, dollar spot, and stem rust. And if there's anything that can chew your budget to bits, it's the unplanned purchase of fungicide for sick grass.

So the next time you're sitting down with the books, don't get lost in all the worry of red and black ink. Instead, think of the rich, green density of Rugby Kentucky Bluegrass. And how its low-maintenance features can help you out of a tight spot.

For more information, write: Rugby, P.O. Box 923, Minneapolis, Minnesota 55440.

Rugby
KENTUCKY BLUEGRASS
For low-maintenance turf

Circle No. 153 on Reader Inquiry Card

LANDSCAPE LOG

By Douglas Chapman, horticulturist, Dow Gardens, Midland, Michigan

Zimmerman Pine Moth.

By April, dormancy is about to break, much of the pruning should be completed, and our landscape log should highlight insect control, planting and fertilizing.

Insect Control

Timing of insect control is paramount to results. The idea is to control the insects before they become a problem and more expensive pesticides are needed.

The catastrophic insects we can control during April include many scale, aphids, and mites by using dormant or superior oil sprays to the point of runoff. One should survey target trees.

Scales which overwinter on host plants include:
euonymus scale
lecanium scale
oystershell scale
crimson erineum scale
pine tortise scale
European elm scale
juniper scale
cottony maple scale
golden oak scale
Fletcher scale

Aphids are sucking insects which attack almost every tree or shrub. They overwinter in the egg stage and are also vulnerable to dormant oil.

Mites are also sucking insects which can cause significant damage to yews, crab apples, arborvitae and other plants. The two-spotted mite and the spider mite are two primary landscape mites. They are difficult to observe, but in significant populations cause bronzing of foliage, ultimate defoliation, disfigurement, and/or death.

Pine insects are another large group of insects which can be controlled in early spring. A significant number of insects affect the terminals and new growth of pines. Since pine's meristematic tissue is located in buds or new growth only, death of the terminal results in severe branch thinning and deformity. This ultimately leads to weakening and death.

Pine insects include European Pine Shoot Moth, European Pine Sawfly, White Pine Weevil, and Zimmerman Pine Moth.

Timing application of insecticides will increase in the future due to budgetary and environmental constraints. Timed applications of short residual insecticides and/or biological controls will become critical.

Biological indicators will help the landscape manager determine when the insect is in the most vulnerable stage. Bud swell, flowering, and commencement of growth will become important indicators of pesticide timing. A few examples are lilac bloom with both pine needle scale crawler hatch and spruce bud worm larval emergence, and forsythia flower opening with European pine shoot moth larval emergence.

One drawback is the strong influence of microclimate. In one location there can be as much as two weeks difference within a half mile as a result of exposure, sloping, or water.

Transplanting

Transplanting is best accomplished while the plant is still dormant but the frost is out of the soil. This gives us the choice of using bare root, balled and burlapped, or container plants with greatest chance of survival. After dormancy breaks, bare root transplanting is less successful. Balled and burlapped success decreases as growth commences. Container plants are not as affected by dormancy or growth. Generally, bare root stock is cheaper than balled and burlapped, and balled and burlapped stock is cheaper than container. So timing can save money as well as increase transplanting success.

The keys to transplanting early in the spring are to continually keep the root system covered with a thin film of moisture, use some form of organic matter to condition the soil in the hole, and water thoroughly after planting to provide intimate contact between roots and soil.

Fertilization

Early spring fertilization can help reduce the need for insect or disease control by reducing the impact of insects and/or disease. Fertilizer, applied in early spring, has more positive impact than fertilizer applied later in the season.

Fertilizer can be applied to the soil surface at the rate of 2 to 4 pounds of nitrogen per 1,000 square feet of soil surface under the tree. The best defense remains a good offense. A healthy vigorous landscape is less impacted by insects and disease. **WTT**

April Job Focus

1. Insect Control
2. Transplanting
3. Fertilization

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Circle No. 118 on Reader Inquiry Card

SERIOUS SOCCER

Northbrook goes bulk for soccer field nutrition

The residents of Northbrook, Illinois take soccer seriously. The Northbrook Park District soccer fields are used all year except for baseball season. Some fields are even used for night games.

When Mike Schiller, director of parks/facilities maintenance, took his job three years ago, the soccer fields presented an unusual challenge. Today, natural turf is beating the soccer players, except for goal areas. "My goal is to grow turf in soccer goal areas someday," says Schiller.

Northbrook backed Schiller up when he advised all soccer fields needed to be improved. With the support of his boss, Tim Miles, Schiller launched a five-year program to show soccer fans what soccer fields can be with proper knowledge and funding.

An intensive program of aerification, fertilization, and overseeding has vastly improved the fields. The Northbrook fields are now used as an example of good athletic field management by local and national groups.

Schiller is the first to admit much of the advice received from local experts. He presented his goals to James Halloran of Arthur Cleson Inc., a supplier in Wheeling, IL, and Mark Grundman of Northrup King. They were to achieve a constant growth of turf to avoid periods of weak turf or excessive growth and to cut the number of times fertilizer bags were handled down from three. He also needed to correct compacted soils.

Taking their advice and adding it to his own knowledge derived from a degree in park operation management from Harper College

Schiller describes *his soccer field program during a seminar held in Northbrook last fall.*

Northbrook receives *(below) custom-blended fertilizer in 4½-ton trailer.*

in Pallatine, IL, and five years as parks superintendent at Libertyville, IL, Schiller began a custom bulk fertilizer program combined with aerification and overseeding four times per year.

The fertilizer is custom blended through Cleson by IMC. It is delivered to Northbrook in a 4½-ton auger trailer. A 4½-ton trailer spreader is loaded from the trailer. All Northbrook has to do is provide a tractor to pull and drive the PTO spreader and a driver. Northbrook no longer needs to handle bags of fertilizer. Schiller says 95 hours of labor are saved each year this way.

The fertilizer is rated 25-5-14.5. The nitrogen is half urea and half Nitroform. The phosphorus is Diammonium Phosphate and the potash is Sulphate of Potash. It is applied at 4 lbs. per 1,000 square feet four times per year. This program has provided constant turf growth and allowed Schiller to schedule mowing much more efficiently.

Four times a year the fields are aerified and dragged with a Huerst Flexible Tine Harrow. Topdressing is done twice each year in heavy traffic areas. In addition, the fields are overseeded with a Jacobsen Aeroblade Overseeder with a mix of Rugby and Parade Kentucky bluegrasses and NK-200 and Delray perennial ryegrasses. This mix is called NK Medalist North.

None of the fields are irrigated. So Schiller uses a penetrant from Precision Labs of Northbrook. He uses AquaGro on the park districts golf course.

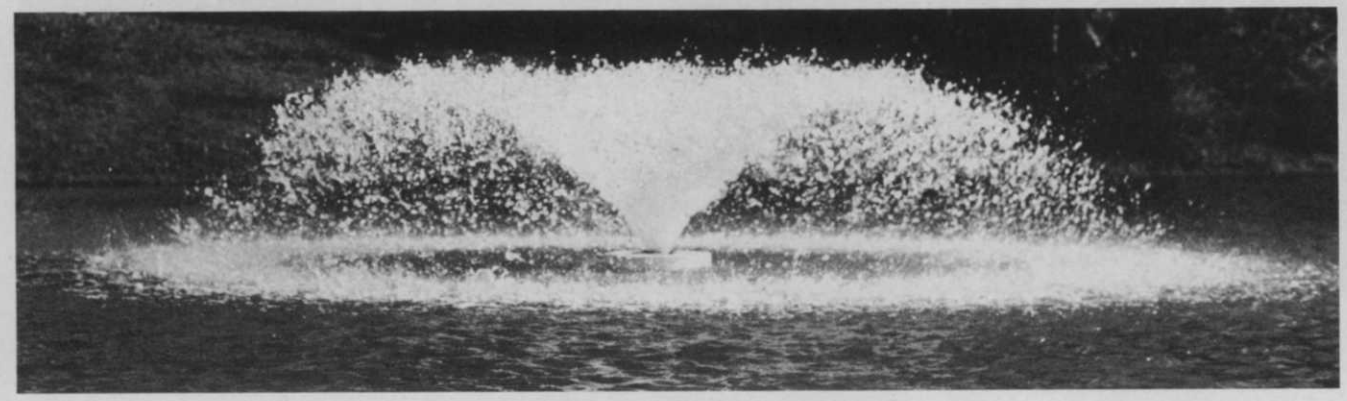
Herbicides are applied in spring and fall, with spot treatments when needed. Trimec is the primary herbicide used with Methar 30 when needed. The penetrant is applied with the herbicides and iron for color.

Many of the systems used for the soccer fields have been moved over to the 27-hole golf course under Schiller's supervision. The soccer fields are just a step to a larger overall goal to provide recreation to Northbrook citizens. "The people in our district are very recreation-minded," says Schiller.

Soccer players have good fields without artificial turf or without massive reconstruction.

"And the Park board has an excellent relationship with the village government." Illinois has created special tax districts for parks so cooperation is essential.

"Our plans include a clubhouse for the golf course, a miniature golf course, and improving the driving range." Ten soccer fields and 20 baseball fields, added to the golf course, make Schiller's job a big one. **WTT**



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OFTANOL can be applied with either drop or rotary spreaders and, normally, needs no watering in to work. Its low water solubility resists leaching, so OFTANOL is retained in the upper soil profile where it controls grubs on contact.

OFTANOL can also take out existing populations of sod webworm larvae, Hyperodes weevil, billbugs, and chinch bugs. Just follow directions on the label.

With its lasting residual action, OFTANOL requires fewer applications and is more economical than other insecticides.

OFTANOL provides the most effective control of mole crickets of any product presently registered, but such use is limited to states which have issued Special Local Need registrations. Check with your state extension office.

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PeCo, Inc.
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Circle No. 168 on Reader Inquiry Card

Weed Control Guide

WEEDS TREES & TURF

Turf

by Dr. Euel Coats

The WEED CONTROL GUIDE is updated and published each March. This year Dr. Euel Coats, associate professor of weed science at Mississippi State University, and Dr. Elton Smith, professor of horticulture at Ohio State University, improved the Guide from last year. Considerably more attention has been given to weed control in non-turf areas and to warm-season turf weed control. O.M. Scott & Sons contributed the use of its weed identification drawings. The Weed Control Quiz illustrations are courtesy of the New York State Turfgrass Association.

Efficiency and economy are two very important factors in landscape weed control today. Understanding the details of each part of a weed management program contributes to the efficiency of the whole program.

Rarely do herbicides alone completely eliminate, or maintain at acceptable levels, the weeds in turf or landscape. Chemical control without adequate fertilization, disease control, irrigation, and soil conditions is ineffective and very short term. The best aid to control is a healthy, vigorous turf and landscape.

Weed control with herbicides in warm season turf is rather complex primarily because the number of species and cultivars. There are at least six turfgrasses used in the Southern United States; bahiagrass, bermudagrass, carpetgrass, centipedegrass, St. Augustine, and zoysia. Two of these, bahiagrass and carpetgrass, are often weed problems in the other Southern turfgrasses.

Dichondra can be added to the list but it is limited to areas of the Southwest that are irrigated. In the Southeast, dichondra is almost exclusively a weed problem.

A few species of cool-season turfgrasses are used in the South, maintained for the most part as annuals and used in overseeding programs for color during the dormant season. These include annual and perennial ryegrass, rough bluegrass, creeping bentgrass and red fescue. The Southern landscape manager may require weed control programs for both warm season turf and the overseeded cool-season turf.

Turfgrass species are often mixed in cool-season turf. Mixtures of Kentucky bluegrass, perennial ryegrass, and red and chewings fescues are standard. Tall fescues, including dwarf and fine-leaved tall fescues, are the backbone of many utility turfs. The bentgrasses (creeping and colonial) are used primarily for specialty turf such as golf greens. Chewings fescues and an increasing degree of sheep fescue are working their way into cool-season turf programs.

Woody ornamentals and annual plantings are even more complicated than turfgrasses owing to the large number of species and varieties. It is important to consider the effects of soil amendments, particularly organic matter, on herbicide effectiveness in ornamentals.

In this Guide, the focus will be on the primary target weeds and the products or practices that most effectively control them. It is a collection of current herbicide usage information as reported by two weed scientists. A separate section on landscape weed control follows the section on turf weed control. Herbicide labels, as well as your university weed control specialists, are sources of additional specific information.

Weeds

Proper identification of weed species enables the landscape manager to time preemergence and postemergence applications correctly and use the most effective herbicide for that particular weed.

Many of the weed problems a landscape manager faces are solved by knowing the weed history of the area. Records should be kept to show what weed species are indigenous to the area and, consequently, what weed seeds are present in the soil and are likely to appear year after year in problem proportions.

If a weed problem develops which doesn't conform to the history, the weed seed was brought into your area in soil, seed, or another carrier. By using identification illustrations, the new problem weed can be classified for control.

All plants can be classified as either annual, biennial or perennial.

Annuals complete their life cycle in one growing season. They are further subdivided into summer annuals and winter annuals. Summer annuals germinate in the spring or summer and complete their life cycle during the warm growing season. Winter annuals germinate in the fall, complete their life cycle during the winter, and die in the early part of the next growing season. Annual bluegrass, henbit, and common chickweed are examples of winter annuals. Large crabgrass and goosegrass are summer annuals.

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Turf Weed Identification

Germination of weed seed will occur only if the necessary environmental conditions exist; moisture, temperature, light, oxygen, etc. One significant aspect of the control mechanism of germination is each particular weed species has a definite and predictable pattern of germination. This is known as periodicity. Few species germinate freely throughout the year.

Characteristically, a large percentage of the seed of a given species will germinate when the conditions for germination are first met, with subsequent lower germination throughout the remainder of the growing season. Annual bluegrass, henbit, common chickweed, and clovers usually fit this category. Other species such as large crabgrass and goosegrass tend to germinate freely after the initial flush of seed germination.

Biennials and perennials germinating from seed also exhibit periodicity. They are treated as annuals when preemergence control is applicable.

Biennials require two years to complete their life cycle. In the first year, plants of this type form rosettes (radial clusters of leaves growing close to the soil) and during the second year they send up flower stalks and produce seed.

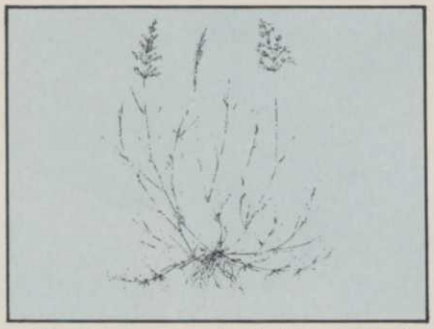
Perennials live for more than two years and are especially difficult to control because they reproduce by vegetative means as well as by seed. Dallisgrass, torpedograss, dandelion, wild onion, wild garlic, and nutsedges are among the more commonly occurring perennial weeds.

Once established, control of perennials becomes increasingly difficult. Perennials germinating from seed are not significantly different from annuals. However, perennials are established before the problem is usually recognized.

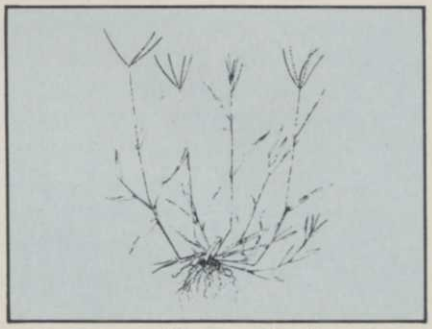
Perennials spread from specialized vegetative structures both above and below the soil surface. Effective selective control of established plants can be obtained only with postemergence herbicides that will translocate to these reproductive structures.

A second distinction important to weed control is whether the weed is a grass (monocot) or broadleaf (dicot). Herbicides are often selected by how they disrupt the life processes of either grasses or broadleaf weeds. The effectiveness of these herbicides depends greatly upon this distinction.

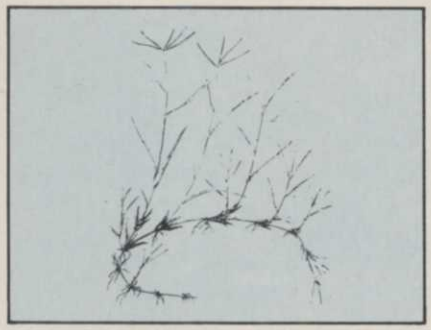
Grasses



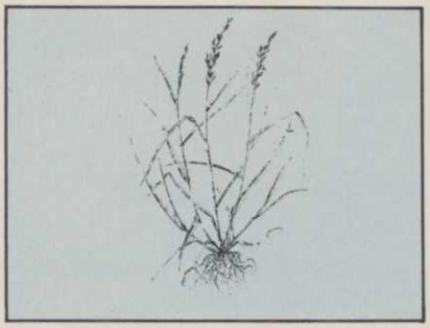
Bentgrass - A desirable grass in certain locations, creeping bentgrass can encroach on cool season turf consisting of Kentucky bluegrass, perennial ryegrass, and fine fescues. Bentgrass has extremely small seed and is a major target of seed producers during seed cleaning for certification. It is extremely difficult to treat lawns to remove bentgrass.



Crabgrass-The predominant target of many turf weed control programs, crabgrass spreads by seed and by rooting at lower nodes (where stem and leaf join). This pale green grass forms dense patches damaging the appearance of a lawn. This annual grass can be controlled to great degree with preemergence herbicides.



Bermudagrass-Like bentgrass, bermudagrass encroaches on other desired turfgrasses. A desirable turfgrass for the South, bermudagrass can be a problem in cool-season turf. This extremely hardy grass can outperform other warm-season turfgrasses. It spreads by stolons and rhizomes. Bermudagrass turns brown early in the fall in cooler climates while other grasses remain green.



Tall Fescue-A coarse, hardy bunch grass often planted for utility turf. This perennial sends down roots far below other cool-season turfgrasses and consequently exhibits drought tolerance. Tall fescue can withstand poor soils and has a low fertilization requirement. These characteristics have caused researchers to develop finer bladed selections for lower maintenance lawns. It is difficult to eliminate from stands of other turfgrasses.

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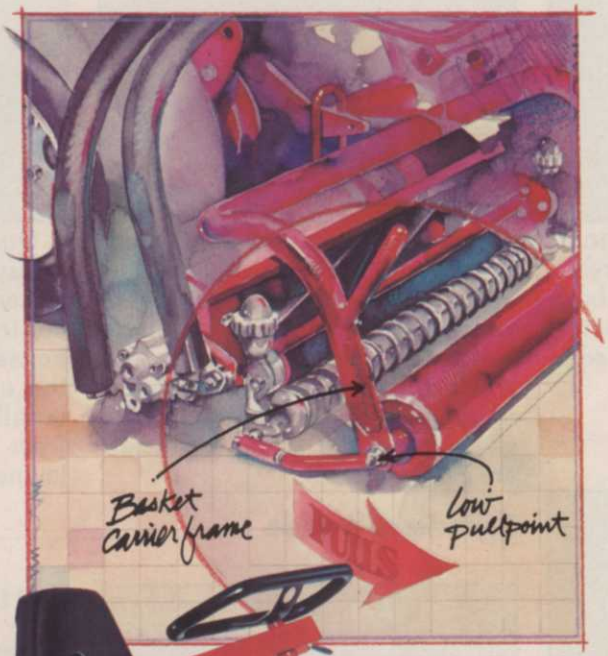

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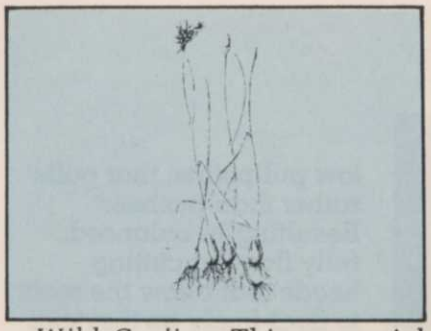
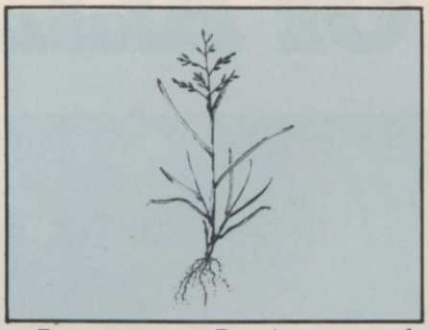
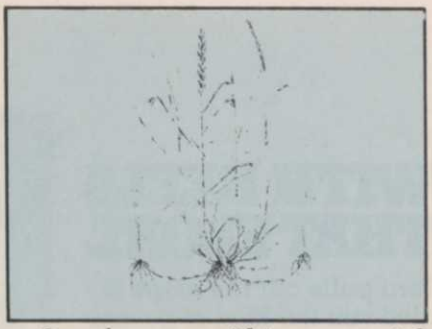


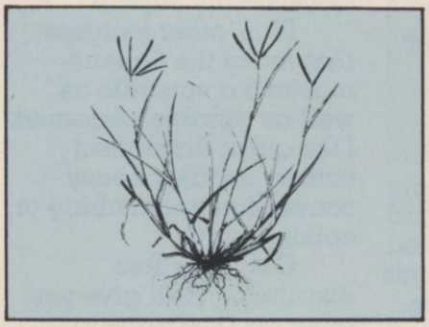
Wild Garlic - This perennial monocot is not a grass and spreads not only by seed, but from above and below ground bulbets. Control must stop germination of seed AND kill the bulbets.



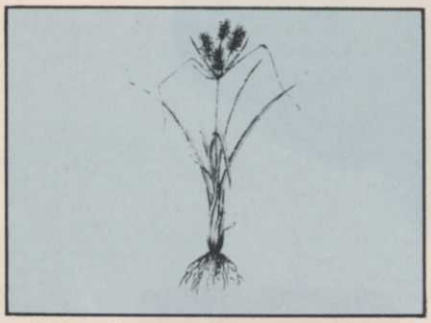
Poa annua - Persistant seedheads and blotches of summer-killed annual bluegrass make this a weed in the summer in the north and in the winter in the South. This weed thrives in well-fertilized, irrigated, and low cut turf. Its light green color and white seedheads are easily spotted.



Quackgrass - This perennial grassy weed spreads vigorously by rhizomes and is extremely hard to control. Spot treatment with nonselective herbicides is often the only solution. Quackgrass is usually present when topsoil came from rural areas, such as in new lawns.

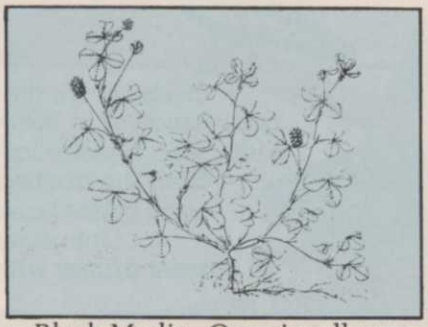


Goosegrass - This annual grass takes advantage of exposed areas with compacted soil. Postemergence treatments work best on this wiry grass.

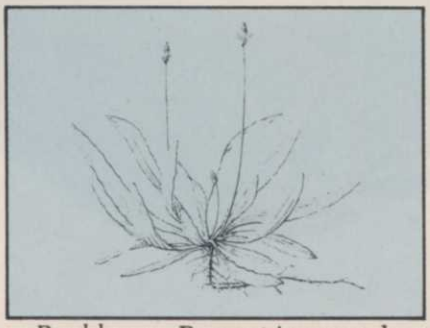


Nutsedge - Yellow nutsedge is a major weed problem of turf. The perennial weed reproduces both from seed and underground tubers. The yellow color makes it stand out. Systemic herbicides are required to kill the tubers.

Broadleaf Weeds



Black Medic - Occasionally confused with clover, black medic is an annual legume. It is common throughout the U.S. and has small yellow flowers.



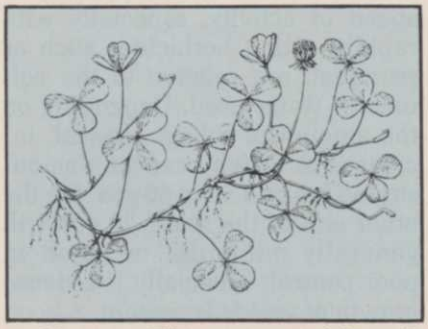
Buckhorn - Present in many low budget lawns and mow-only turf areas of parks. Buckhorn has a taproot that defies hard weeding.

This perennial resembles plantain.

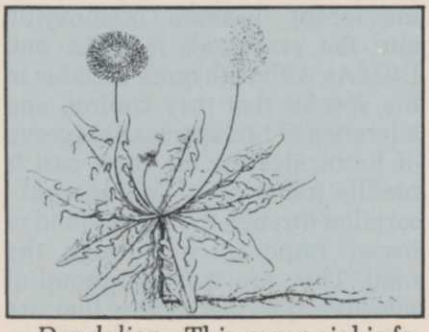
Common Chickweed - This annual spreading weed of shady, moist areas has a white flower and light green foliage.

Mouse-Ear Chickweed - The

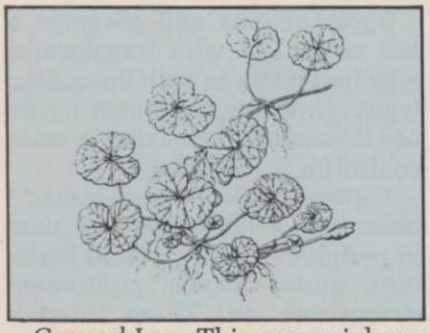
perennial version of chickweed prefers open sun and also has white flowers.



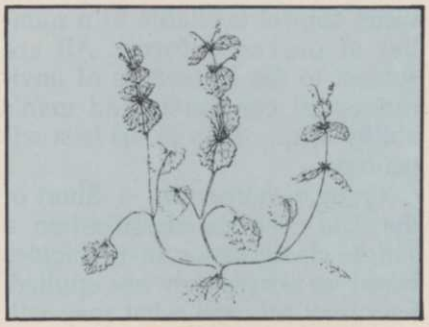
Clover - This perennial broadleaf embarasses turf managers with large pink flowers in the spring and tan patches of dead foliage in the summer.



Dandelion - This perennial is famous for its taproot and yellow flower which later becomes a puffy seedhead in late spring.

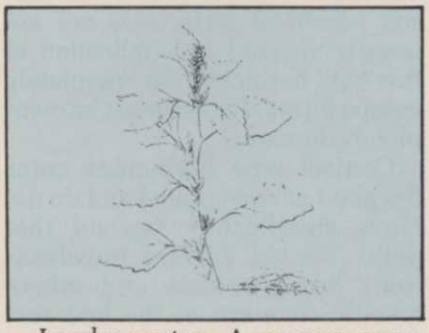


Ground Ivy - This perennial can dominate in poor, shady soil. A member of the mint family, this aggressive spreader hugs the ground and produces a purple flower.

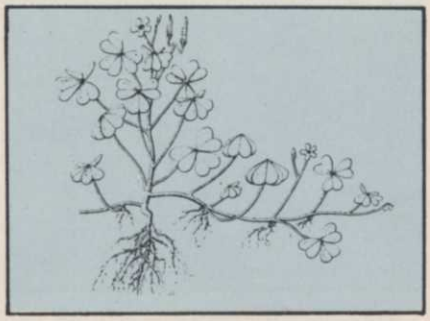


Henbit - Taller than ground ivy, despite purple flowers and scallop-shaped leaves, henbit is a winter annual most noticeable in early spring.

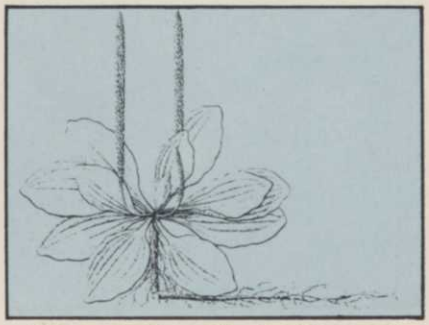
Heal-All - This hairy-leafed perennial is common in new and poorly maintained lawns throughout the U.S. It can spread beneath the level of mower blades.



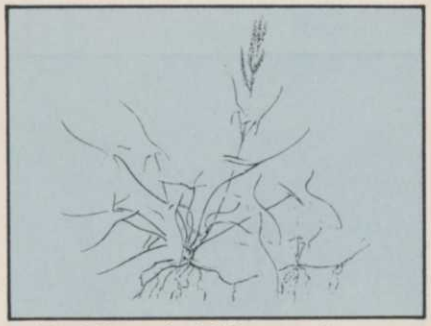
Lambsquarter - A summer annual of large size if not mowed. Foliage is bright light green.



Oxalis - This perennial broadleaf spreads by rooting at the nodes and by seed from pods following flowering. Small yellow flowers mature into long, narrow seedpods. Selective control is ineffective.



Plantain, broadleaf - Hosta-like leaves of this perennial surround tall purple stalks containing seeds. The leaves, unlike hosta, lay flat on the surface of the soil.



Red Sorrel - This tenacious perennial has arrow-shaped leaves and spreads by roots and rhizomes. It can quickly overtake desirable turf weakened by acid soil. Alkaline soils can discourage Red Sorrel from getting established.

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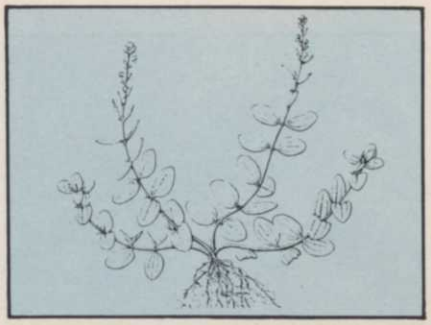
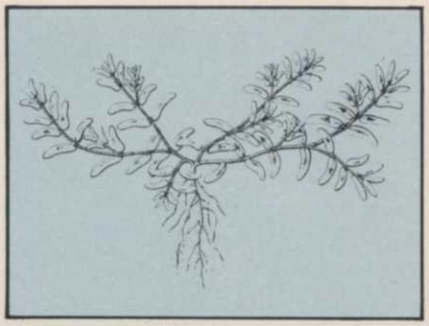
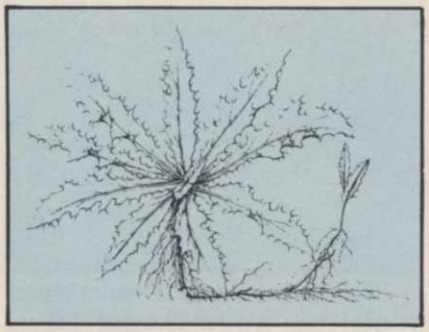
Turf



Speedwell - There are both annual and perennial members of this weed family. White to purple flowers bloom above heart shaped seedpots. Spot treatment is often the only control once established.



Spurge - The leaves of spurge contain a spot in the center of the upper surface. The seed of this heavy producer germinates in early spring. The spreading branches of this annual contain a milky substance.



Sow Thistle - This annual has flowers similar to dandelion but its leaves have spines on the edges and deeper indentations. Selective control is effective.

Herbicides

Herbicides are chemicals used to kill or inhibit the growth of plants. There are many kinds of herbicides for general and specific weed control available in a number of packaged forms. All are subject to the influences of environmental conditions and man's ability to use them to his best advantage.

Types of herbicides — Short of the rigid chemical classification, a simple classification of herbicides based on where they are applied, how they act, and what they will control is perhaps most useful.

I. Foliage Applied
  A. Contact
    1. Selective
    2. Nonselective
  B. Translocated
    1. Selective
    2. Nonselective

II. Soil Applied
  A. Short residual
    1. Selective
    2. Nonselective
  B. Long residual
    1. Selective
    2. Nonselective

Foliage applied - contact - selective herbicides are of little importance in turf or landscape.

Foliage applied - contact - nonselective herbicides used in turf landscape include paraquat and cacodylic acid (Phytar 560). These herbicides will kill all green and growing foliage contacted by spray solutions. Foliage of plants such as dormant bermudagrass, zoysiagrass, and other warm season perennial turfgrasses are not usually affected by application of this type herbicide. To completely escape injury, foliage must be completely dormant.

Contact type herbicides enter the plant where applied and do not move significantly beyond that point (limited upward translocation). Spray volume and subsequently coverage of the leaf surface of the target plants is very critical for maximum control. Extremely low volume applications will often result in inadequate coverage and will kill the upper layer of the foliage canopy. Regrowth occurs in a comparatively short period of time.

With contact herbicides increases in control and possibly in speed of activity, especially with rapidly acting herbicides such as paraquat, are relative to the volume of water used. Depending on the amount of foliage present, increases in activity can be demonstrated beyond 50 to 60 gpa. On the other end of the scale, 20 gpa will generally minimize, or result in poor control, especially if a dense growth of weeds is present. A good compromise is perhaps 30 to 40 gpa.

Foliage applied - translocated - selective herbicides are absorbed into and move to points beyond the point of entry and kill plants. The most common herbicides in this group are the phenoxys (2,4-D, mecoprop), dicamba, bromoxynil, and the arsenicals (MSMA and DSMA). Although quite variable in the species that they control, and tolerance of turf species, this group of herbicides for the most part is readily translocated following absorption through the foliage (and of lesser importance through the root). They are the only group of selective type herbicides that are effective on perennial weeds. They are more effective than contacts since translocation (downward) of the herbicide to reproductive structures can take place following uptake by the foliage of the plant.

Spray volume and coverage is not as critical with translocated type herbicides as with the contact types. However, adequate coverage is essential for maximum weed control (of 30 to 40 gpa).

Foliage applied - translocated - nonselective herbicides are used in peripheral areas (around buildings, under fences, equipment storage lots, etc.). These materials are applied to the foliage of the target species and generally control

continued on page 39

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all weed species present. Many of the foliage applied translocated selective herbicides above may become non-selective at extremely high rates. More often than not at higher rates they behave as contact type herbicides.

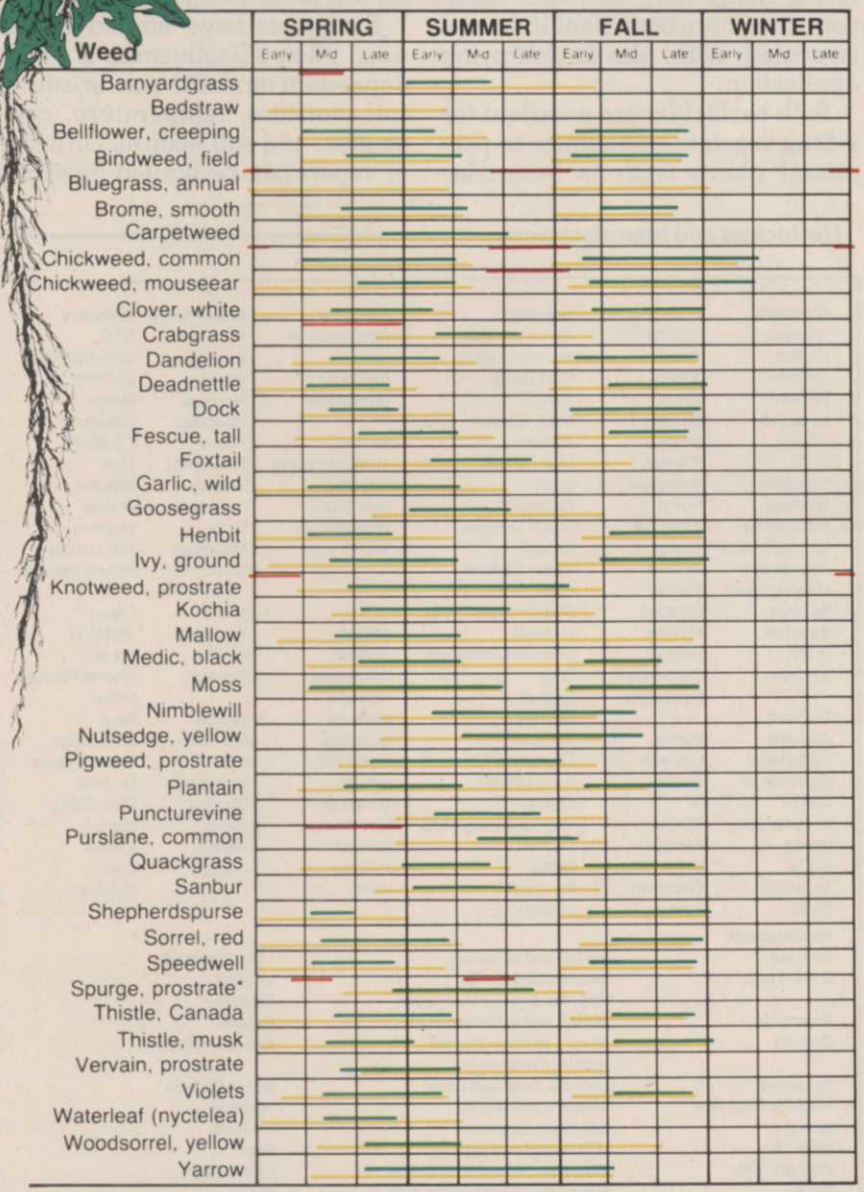
More pertinent examples of these foliage applied-translocated non-selective herbicides are dalapon (Dowpon), amitrole, and glyphosate (Roundup). In many respects, although somewhat of an oversimplification, this group of herbicides differs from the translocated-selected types only in that they are nonselective.

Soil applied - short residual - selective herbicides include the widely used preemergence herbicides DCPA, benefin, bensulide, atrazine, simazine, and pronamide. Pronamide and simazine applied to the soil also control established annual bluegrass (postemergence). Maximum residual activity of these herbicides is a matter of weeks to a few months as compared to the long term residual herbicides in which control for several months would be expected.

Application technique, as with all types of herbicides, is important. While volume of spray solution is not as critical as with postemergence herbicides, even distribution is necessary for uniform effective control. These herbicides (preemergence) represent our best approach to the control of annual and biennial or perennial weeds germinating from seed. Where effective, these herbicides eliminate the competition effects that are encountered from the time of germination to the time of control where postemergence herbicides are also used.

Soil applied - short residual - non-selective herbicides are the temporary soil sterilants. They are usually referred to as fumigants and include methyl bromide and metham (Vapam). They are active in the vapor forms. Methyl bromide is a gas at atmospheric pres-

CHART 1
Growth and treatment periods



Active period of plant growth. Varies from year to year and from north to south.
Apply preemergence chemicals.
Apply postemergence treatments. Approximate periods may vary two weeks from season to season. Use granular or wax bar formulations of 2,4-D, Banvel D, Silvex, and 2,4,5-T from late spring through early fall.
* Preemergence herbicide applications should be made a second time in late June or early July.

sure while metham, although formulated in liquid form, is converted to a toxic gas in the soil. Because of their volatile nature, both compounds require some kind of sealing to prevent evaporation into the atmosphere. Methyl bromide must be applied under a gas-tight cover (usually plastic) while vapam can be sealed by watering (irrigation), although weed control is more consistent if the soil is sealed with plastic following application.

Both herbicides are excellent for killing vegetative structures of perennial plants such as bermudagrass, nutsedge, and torpedograss and are effective on a large number of weed seed, fungi, and insects. This group of chemicals is the only one that will kill weed seed. All other herbicides (preemergence or postemergence types) are only effective against germinating or germinated seeds, i.e., growth must be taking place for this latter group to be effective.

Fumigants have limited usefulness. Their effectiveness is highly dependent on the characteristics of soil moisture, temperature, compaction, and soil texture. Diffusion of vapors can be limited by excess moisture and/or compacted soils. And fumigants are extremely expensive. However, in certain turf establishment situations there is no alternate to these herbicides.

Soil applied - long term residual - selective and non-selective. Both groups will be combined in this discussion. Although certain examples could possibly be given of the selective type, for the turf user this group constitutes the nonselective soil sterilants. Their use is very limited in turf facilities and specifically are used in peripheral areas (to the turf or ornamentals where total vegetation control is desired and are usually effective for several months.

Bromacil (Hyvar®), karbutylate (Tandex®) and borate compounds are just a few examples of soil sterilants. These are active via the soil. Several mixtures of these and other compounds containing materials such as amitrole to give quick foliage kill are also available. Lateral movement of soil sterilants into turf areas can be a significant problem.

Herbicides and Manufacturers

Chemical	Brand Name	Company
amitrole	Amitrol-T	Union Carbide
asulam	Asulox	Phone Poulenc
atrazine	Atratol	Ciba Geigy
benefin	Balan	Elanco
bensulide	Betamec	P.B.I. Gordon
	Betasan	Stauffer
	Pre-San	Mallinckrodt
bentazon	Basagran	BASF
bromacil	Hyvar	Du Pont
bromoxynil	Brominal	Union Carbide
cacodylic acid	Phytar	Crystal
chloramben	Amiben	Union Carbide
chlorpropham	Furloe	PPG
dalapon	Dalapon	Diamond Shamrock
dazomet	Mylone	Hopkins
DCPA	Dacthal	Diamond Shamrock
dinoseb	Premerge 3	Dow
	Dynamyte	Drexel
Devrinol		Stauffer
dicamba	Banvel	Velsicol
dichlobenil	Casoron	Thompson Hayward
diphenamid	Enide	Tuco/Upjohn
DSMA		Crystal
dinitrophenol	Dinitro	Thompson Hayward
diuron	Karmex	Du Pont
diquat	Ortho Diquat	Ortho
endothall	Endothall	Pennwalt
EPTC	Eptam	Stauffer
Ethofumesate	Prograss	BFC
fenac	Fenatrol	Union Carbide
fosamine	Krenite	Du Pont
glyphosate	kleenup	Ortho
	Roundup	Monsanto
linuron	Lorox	Du Pont
methyl bromide	Dowfume	Dow
metham	Vapam	Stauffer
metribuzin	Sencor	MoBay
monuron	Urox	Hopkins
MCPP	Mecomec	PBI Gordon
	Chipco Turf Herbicide	Rhone Poulenc
	MCPP	Cleary
MSMA	Weedhoe	Vineland
oryzalin	Surflan	Elanco
oxadiazon	Ronstar	Rhone Poulenc
paraquat		Ortho
picloram	Tordon	Dow
prometon	Pramitol	Ciba Geigy
pronamide	Kerb	Rohm & Haas
siduron	Tupersan	Du Pont
simazine	Princep	Ciba Geigy
tebuthiuron	Spike	Elanco
trifluralin	Treflan	Elanco
triclopyr	Garlon	Dow
Vorlex		Nor-Am

Combinations		
Amizine	amitrol and simazine	Union Carbide
Banvel plus	dicamba and 2,4-D	Velsicol
	dicamba and 2,4-D, dalapon	Velsicol
Broadside	MSMA and cacodylic acid	Crystal
Chlorea	diuron, sodium chlorate, sodium metaborate	Rhone Poulenc
Fenamine	amitrole, fenac, atrazine	Union Carbide
Hopkins Rout G-8	bromacil and diuron	Hopkins
Krovar	bromacil and diuron	Du Pont
MonDak	MSMA and dicamba	Velsicol
Pramitol 5PS	prometon, simazine, chlorate	Ciba Geigy
Tordon	picloram and ammonium sulfate	Dow
Trimec	2,4-D, MCPP, and dicamba	PBI Gordon
Urox	monuron and TCA	Hopkins
Vegemec	prometon and 2,4-D	PBI Gordon
Weedmaster	dicamba and 2,4-D	Velsicol
Weedone	dichlorprop and 2,4-D	Union Carbide

Factors Affecting Herbicide Activity

Most herbicidal failures aren't failures of the herbicide. Conditions (temperature, moisture, timing, application method, herbicide selection, etc.) are usually responsible for most "failures" we hear about. If we understand the conditions necessary for maximum effectiveness of a herbicide, many of the variables contributing to "failure" can be minimized.

To be most effective, herbicides must be applied at the appropriate time in relation to germination or growth of the target species. Herbicides may be applied in a number of ways but basically for applications to turf we are dealing with those that are applied directly to the target weed (post-emergence) and those that are applied to the soil (preemergence). In both cases we are making applications in es-

continued on page 44

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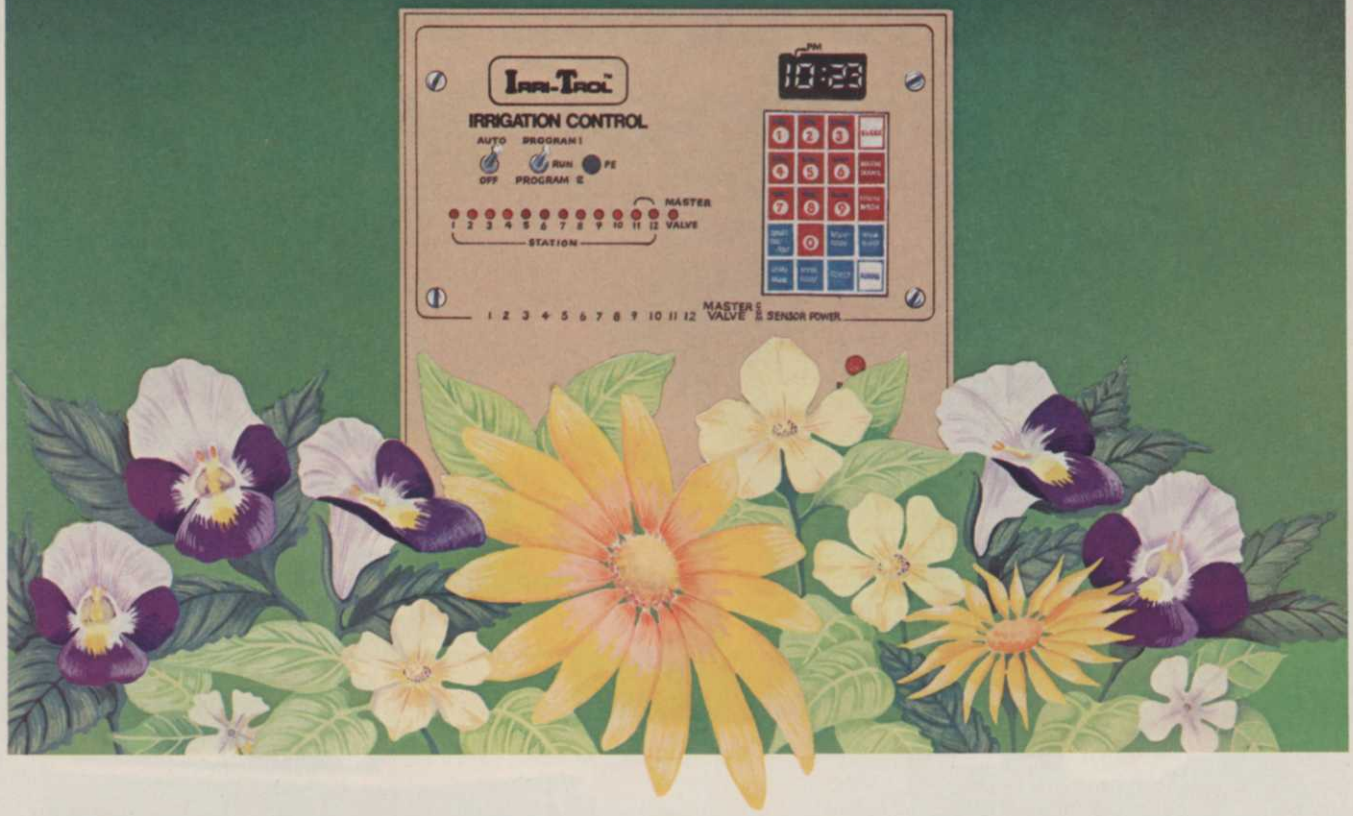

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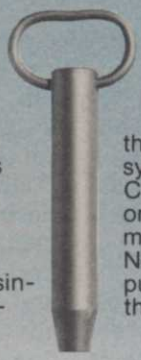

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tablished turf and, consequently, this application is also made directly to the turf. In the case of preemergence herbicidal applications either supplemental irrigation or natural rainfall are employed to wash the herbicide from the turf foliage and get it to the soil surface and into the soil. Rainfall and/or irrigation are detrimental to the effectiveness of a postemergence herbicide immediately following an application. An understanding of the factors influencing the efficiency of both preemergence and postemergence herbicides is certainly helpful in explaining results obtained and maximizing the control obtained with herbicides.

Preemergence applications: Application of a herbicide before weed seed germinate. Preemergence herbicides are not effective against perennial weeds or established annuals. To be effective, herbicides must be applied uniformly over the area. Their action is exerted only during or after germination as growth commences. Therefore, application to a dry soil severely reduces the effectiveness of preemergence herbicides unless moisture is added soon after treatment. Time of application must correspond to periods of germination. If annual bluegrass germinates starting September 1, an application of a preemergence herbicide such as DCPA, benefin, or bensulide on December 15 will be of little value. In contrast, if goosegrass germinates June 1, then a March 15 application will probably be ineffective. The residual level of the herbicide at this time would be too low to give control.

Postemergence applications: Application after weed seed have germinated or broken through the soil surface. The herbicide is applied to the foliage of the weed plant. Postemergence herbicides act as contact or as systemic (absorbed and translocated) herbicides. Contact herbicides act rapidly while translocated herbicides usually require several days for their phytotoxic action to be observed. Translocated types usually kill the entire plant while contact types kill only the contacted part of the foliage.

Best results will usually be obtained with postemergence herbicides if plants are young, actively growing and the temperature is above 70 F. Foliar applied herbicides are less effective if soil is dry. Consult label for growth stage and environmental conditions for best results with a given herbicide.

Surfactants are frequently recommended for use with postemergence herbicides. For consistent results use nonionic agricultural surfactants, sold specifically for use with herbicides.

Selection of Herbicide and Formulation

Two or more herbicidal products may be equally effective in a given weed situation. Also the same chemical may be available in a variety of commercial formulation trade names.

Your selection of herbicide and formulation will be determined by (1) the weed species involved, (2) the availability of the herbicide, (3) type of equipment at your disposal, (4) established residue tolerances, (5) hazards to humans, domestic animals, wildlife, and desirable plants, (6) relative total costs of materials and application, and (7) time of application.

All recommended rates of application are based on either active ingredient (most chemicals) or acid equivalent. Different commercial products vary in the percentage of active ingredient or acid equivalent. The label will give you the exact amount of weed-killing chemical present in the container. It is wise to figure the price of an available chemical on the basis of its active ingredient or acid equivalent. For example, Herbicide X can be obtained in liquid formulations varying from 6 pounds to less than 1 pound acid equivalent per gallon. Usually, the more concentrated products are more economical on a per acre basis.

Granular formulations of many herbicides are also available. In comparison to sprays, granular herbicides offer both advantages and disadvantages. Some of the advantages are: simpler application - no water or mixing required, less drift, and a tendency toward longer activity in the soil. The problem of accurate calibration of granular equipment and the slightly higher per-acre cost of granular herbicides may offset these advantages. The range of concentration, particle size of product, and varying rates of application complicate calibration. More concentrated materials are usually more economical but errors in calibration are more critical. Calibration charts are supplied by manufactures of granular applicators.

Control Strategy For Warm Season Turf

Comments in this section will be restricted mainly to weed control in bermudagrasses. Zoysia, bermudagrass, centipedegrass and St. Augustine vary in their susceptibility to both preemergence and postemergence herbicides. However, it is possible in most cases to discuss bermudagrass and zoysiagrass as a group and include centipedegrass and St. Augustine in a second group. In general, herbicides that can be used on bermudagrass can be used safely on zoysiagrass. Centipede and St. Augustine are similar in their tolerance to herbicides.

Winter grass weeds

Annual bluegrass is by far the most severe grassy weed infesting southern turf areas during the late growing season through the dormancy period and into the early growing season. It occurs in all turf environments. Aside from decreasing the aesthetic value of turf, the primary objection to annual bluegrass is its rapid die-back in

continued on page 46

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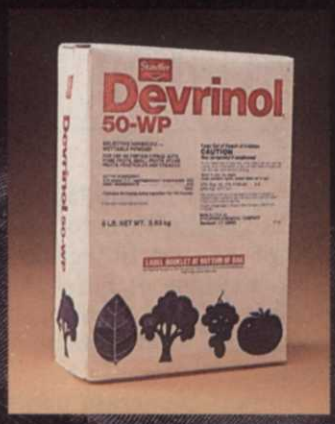

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late spring. Bermudagrass coverage is usually slow following fade out of annual bluegrass leaving large sections of bare ground exposed. Other weeds, such as goosegrass, tend to move into bare areas.

Annual bluegrass control with preemergence herbicides is usually accomplished with either benefin, bensulide, DCPA, Pronamide, simazine, or terbutol. Two applications may be necessary during the dormant season for acceptable control except with Pronamide or simazine.

Pronamide has shown excellent potential for either preemergence or postemergence control of annual bluegrass in bermudagrass.

There are two choices for annual bluegrass control on bermudagrass greens overseeded with perennial ryegrasses. Bensulide may be applied prior to overseeding. Ethofumesate may be applied 15-30 days after overseeding. Check both labels for timing to avoid delaying spring transition.

A third approach, employed particularly on many golf courses, is to use a postemergence application of a non-selective herbicide such as paraquat or cacodylic acid prior to breaking of dormancy. This usually does an excellent job on annual bluegrass as well as those annual broadleaved weeds present. Injury is often encountered if application is delayed until the bermudagrass starts breaking dormancy. The degree of injury is dependent on the amount of green foliage present at the time of application.

Winter broadleaved weeds

Important broadleaf weed species include: common chickweed, henbit, clovers, spurweed, mouse-ear chickweed, lawn burweed, common dandelion, wild onion, wild garlic, plaintains, and speedwells.

Preemergence control can be obtained with benefin, bensulide, DCPA, simazine and other herbicides. Henbit, chickweed, and clovers usually require something other than 2,4-D for postemergence control. In dormant bermudagrass and zoysiagrass, dicamba, or a combination containing dicamba are most used. The phenoxy herbicides are safe on completely dormant turfs. Actively growing turfs vary considerably in tolerance to phenoxy type materials. St. Augustinegrass will usually tolerate a .5 lb/A of 2,4-D with only

continued on page 48

Summary of herbicide treatments on control of weeds in turfgrasses in Georgia. (B.J. Johnson)

Treatments		Weed species[a]								
Herbicide	Rate	Crab-grass	Goose-grass	Henbit	Common chick-weed	Spur-weed	Parsley-piert	Hop clover	Corn speedwell	Annual bluegrass
	lb/A									
Atrazine	2.0			Po	Po	Po	Po	Po	Po	Po
Bensulide	10.0	P					P			P
Benefin	3.0	P		P	P				P	P
DCPA	10.0	P			P				P	
DSMA	3.0	Po								
Ethofumesate										P, Po[c]
Glyphosate[b]	0.5			Po	Po	Po	Po	Po	Po	Po
Metribuzin	0.5		Po	Po	Po	Po	Po	Po	Po	Po
Metribuzin + MSMA	0.12+ 2.0	Po	Po							
MSMA	2.0	Po								
Oxadiazon	3.0	P	P				P	P	P	P
Paraquat[b]	0.5			Po	Po	Po	Po	Po	Po	Po
Pronamide	0.75				P				P, Po	P, Po
2,4-D[d]	1.0			Po	Po	Po	Po	Po	Po	
2,4-D+dicamba[d]	1.0+ 0.5			Po	Po	Po	Po	Po	Po	
2,4-D+mecoprop + dicamba[d]	1.0+ 0.5+ 0.1			Po	Po	Po	Po	Po	Po	

[a]Weeds controlled from preemergence treatments are represented with P and those with postemergence treatments are represented with Po.

[b]Turfgrass must be completely dormant when paraquat and glyphosate are used. Paraquat has restricted use and applicator must be certified. Glyphosate does not have specific label for turf except for renovation.

[c]Safe to apply to bermudagrass overseeded with ryegrass.

[d]Repeated treatments at 2-week interval may be needed for effective control.

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minimal injury. At rates above .5 lb/A St. Augustinegrass is usually injured. This may seem unimportant when using phenoxy on dormant warm season turfs, but invariably application is made at various stages during spring transition. All turfgrasses are more susceptible to phenoxy injury doing this transition period. The combination of mecoprop plus chlorfurenol is often used, especially by the homeowners on St. Augustine.

Summer grass and sedge weeds

Large crabgrass and dallisgrass invade more turf acreage in the Southern United States than any other grasses. Germinating seeds of both can be satisfactorily controlled with benefin, bensulide, DCPA, atrazine, and simazine. Certain formulations of atrazine and simazine are labeled for use on St. Augustinegrass, zoysiagrass, and centipedegrass for sod production while other commercial products containing atrazine and simazine are labeled for homeowner use.

Postemergence control of these two weeds in St. Augustinegrass and centipedegrass can be accomplished only with asulam (Asulox®). In bermudagrass and zoysiagrass, MSMA (monosodium methanearsonate) and DSMA (disodium methanearsonate) are effective. In fact, dallisgrass control is accomplished almost exclusively in bermudagrass and zoysiagrass with the arsonates.

In terms of difficulty of control, goosegrass is the number one summer grass problem in the Southern United States. Timing of application of preemergence herbicides (DCPA, benefin, bensulide or oxadiazon) is of paramount importance if control is to be achieved. We generally think goosegrass starts germinating in significant quantities 4 to 6 weeks after crabgrass. However, this can and does vary. If application of a preemergence herbicide is delayed, this means that large crabgrass will escape because it germinates earlier than goosegrass. In bermudagrass and zoysiagrass, large crabgrass can be controlled quite effectively with post applications of the arsonate herbicides. The use of preemergence herbicides would appear to be a better approach to goosegrass control than postemergence control with arsonates.

Oxadiazon (Ronstar®) gives excellent control of goosegrass, however, cost may be a limitation. Research has shown that MSMA + metribuzen (Sencor) will postemergently give good control of goosegrass.

Other grass weed problems in southern turfs include sandbur, bahiagrass, crowfootgrass, torpedograss, and others. Sandbur and bahiagrass can be controlled with arsenicals. No means of selective control of torpedograss in any southern turf species has been developed at the present time.

Preemergence herbicides for goosegrass control should be applied four to six weeks after application for crabgrass control.

Both annual and perennial sedges are problems in the Southern United States. Purple nutsedge and to a lesser extent, yellow nutsedge are the most severe problems. Multiple applications of arsenicals or an arsenical plus a phenoxy are generally recommended at the present time for purple nutsedge. Successful control is dependent on repeated applications at appropriate intervals. This is the only method commonly used for selective control in southern turf and can be used only on bermudagrass and zoysiagrass. Basagran® can be used if yellow nutsedge is a problem.

Summer broadleaf weeds

Broadleaved weeds are a problem through the Southern United States in turf. However, no single species would appear to reach the level of infestation over large areas equivalent to that observed with large crabgrass, dallisgrass or goosegrass. Among the more important broadleaved weeds are prostrate spurge and Virginia buttonweed. As a group these are rather difficult to control. Multiple applications of 2,4-D + dicamba, Trimec® or Trex-San® are almost always necessary. Researchers generally observe that the use of a good agricultural grade noionic surfactant is warranted.

Control Strategy For Cool Season Turf

The primary preemergence herbicides for grassy and broadleaf weeds in cool season turf are benefin (Balan), bensulide (Betasan, Betamec-4, Pre-San), DCPA (Dacthal), oxadiazon (Ronstar), and siduron (Tupersan).

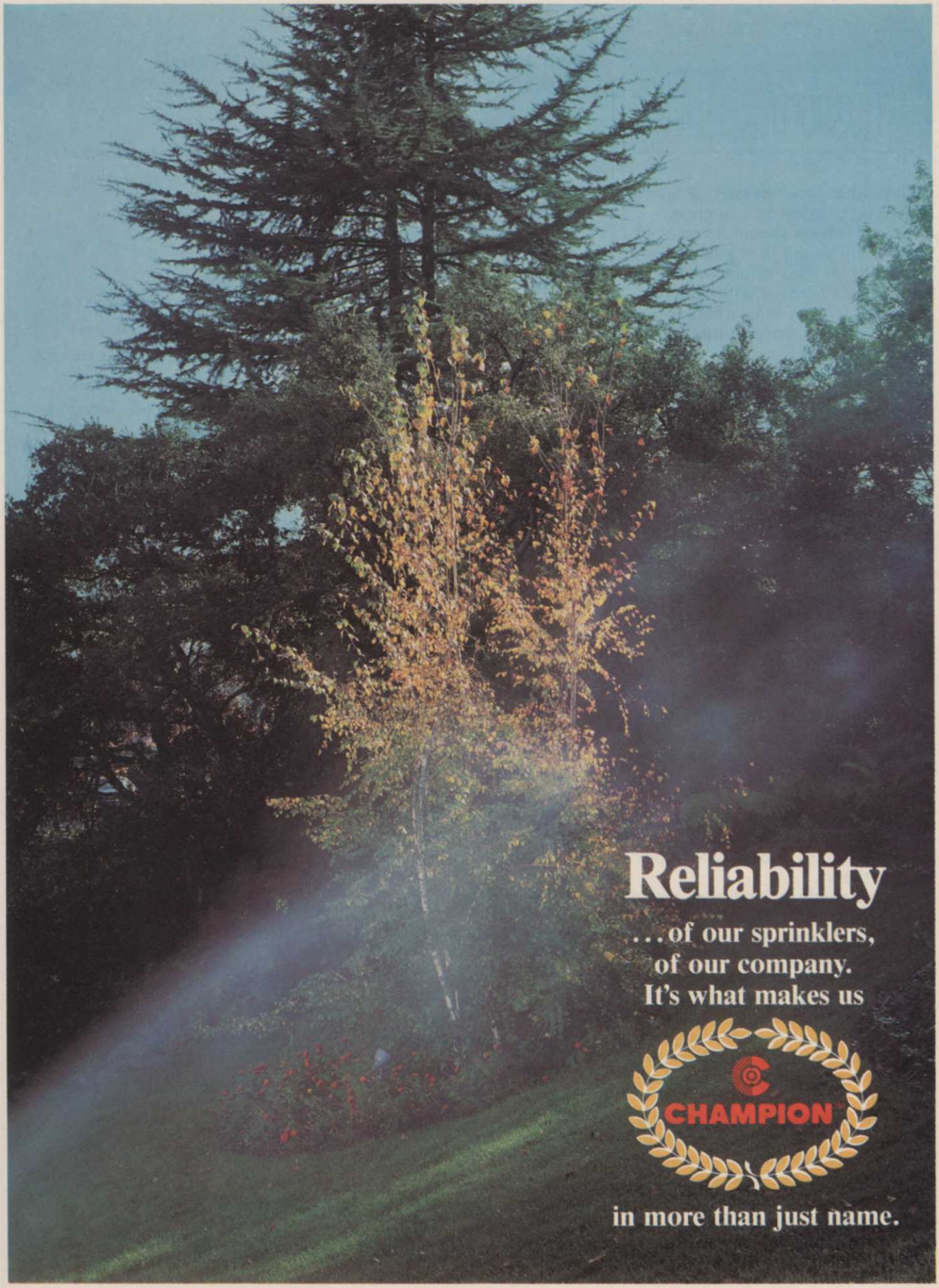
Siduron is the only preemergence herbicide that can be applied near time of seeding. Bensulide and DCPA can be applied in the spring following a fall seeding.

Benefin and oxadiazon should be applied to established turf. Bensulide can affect rooting of existing bermudagrass and caution is advised for use of most preemergence herbicides on bermudagrass greens. Thinning of fine fescue stands has been reported.

Preemergence herbicides should be watered in to get the chemical to the seed prior to germination and should remain effective for two or more weeks. Timing the application is critical. Contact local extension personnel for recommended dates for application.

The primary postemergence herbicides for grassy weeds in turf are the arsonates; CMA, DSMA, MAMA, and MSMA. Treated areas should not be reseeded soon after application. See labels for delay period. Bentgrass and fescue are more sensitive to arsonates

continued on page 50



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than other cool season grasses. CMA is the safest for bentgrass.

Weed foliage should be sprayed while still young (2 to 3 leaf stage) if possible. The effectiveness of arsonates improves with temperature and rates may need to be increased for temperatures below 80 degrees F.

The primary postemergence herbicides for broadleaf weeds are 2,4-D, dicamba (Banvel), and MCPP. These herbicides should not be applied until a new lawn has had at least three mowings. The target weeds should be actively growing for best results. The temperature should be at least 60 degrees F. Applications during extreme heat or drought can cause severe damage to desirable turf.

Again timing information can be obtained from your local extension service. Two treatments are generally necessary. See label for the right amount of time between applications. Winter annuals can be sprayed early in the year, followed by summer annuals and perennials. Fall treatment for perennials is possible.

Postemergence herbicides are often combined to achieve improved control and reduce application time.

Occasionally, a landscape manager chooses to fumigate a seedbed prior to planting to reduce weed seed, control insects and fungi, and eliminate any offtype grasses. Methyl bromide (Dowfume), metham (Vapam), dazomet (Mylone) and Vorlex are used for preplant fumigation. See the labels for the recommended time of delay before seeding.

Turf renovation of existing stands is becoming common. Glyphosate (Roundup, Kleenup) has been very useful in killing actively growing weeds and grasses prior to reseeding. Amitrole, cacodylic acid (Phytar) and dalapon are also used for renovation. Glyphosate and cacodylic acid are deactivated within a few days of application.

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Landscape

by Dr. Elton Smith

Increasing labor costs in recent years have caused an increase in the use of both pre-emergence and post-emergence herbicides. Herbicides are a useful tool on golf courses, cemeteries, parks, arboretums, schools, as well as commercial and residential landscapes.

They are used to control weeds under trees, delineate turf areas, in and around sand traps, around grave markers, in patios, driveways, under fences and in flower, ground cover and woody plant beds.

The effectiveness of a weed control program is only as successful as the person responsible for selection, calculation, calibration, and application of herbicides. It's up to the applicator to create the proper conditions necessary to achieve the desired results. The label specifies those conditions.

Weeds typically found in the landscape are classified as either annuals or perennials. Annual weeds, such as crabgrass, foxtail or purslane, are relatively easy to keep under control by either mulching, cultivation, hand pulling, pre-emergence herbicide application, or a combination.

Perennial weeds, such as bindweed, thistle, quackgrass, or nutsedge, are much more difficult to control by the above methods principally due to their extensive root systems.

Chemical control of weeds at tree bases (top) reduces physical damage caused by mowers and trimmers. The key to weed-free plant beds is to control perennial grasses and broadleaved weeds prior to planting.

Weeds can be controlled prior to or after planting, however, many fail to recognize the importance of eliminating weeds, especially perennials, prior to planting.

Prior to planting

The most successful approach to a weed-free landscape is to control perennial grasses, and perennial broadleaved weeds, prior to preparing the area for planting. Spraying the weeds in the area with one of several post-emergence herbicides which will be translocated to the root system for total plant control is one of the most effective methods of control. Examples of such products would be 2,4-D and related products for broadleaf weed control, dalapon for grass control and amino triazole and glyphosate for general weed control. Each of these normally has to be applied more than once and most have a specific waiting period prior to planting. Glyphosate, a very effective product for perennial grass and broadleaf weed control, has no soil residue.

A number of pre-emergence herbicides are labelled for landscape plants and two are recommended for use prior to planting. Incorporate into the soil, following tillage, either Eptam or Treflan to control annual and some perennial weeds for a period of 4-6 weeks. Following incorporation to a depth specified on the label, planting of the ornamentals can begin. The incorporation of these two herbicides have been used extensively by commercial nurserymen and is now being used by landscape contractors to a large extent, especially where maintenance for a specified period of time is in the contract.

Tillage as a method of weed control prior to planting is a successful practice for the control of annual weeds but not as effective against perennial weeds. In some cases, tillage only cuts up the root system

continued on page 54

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into smaller pieces and redistributes them.

Following planting

In recent years the landscape industry has made extensive use of mulches to prevent weeds in the landscape. Many types of mulches are available, however, the most popular in the Midwest include hardwood, Cypress and pinebark mulches along with wood chips, peat moss, and an assortment of hulls and numerous inorganic types. These should be applied at least 2-inches deep and renewed annually or as needed. Avoid the use of black plastic near woody plants as plastic contributes to excessive soil moisture.

Some weeds will come through the mulches. These must be hand pulled or sprayed. Seeds will be carried into planting beds by wind and birds and will often germinate in the mulch. Again, hand pulling is the most satisfactory control measure in small areas, however, landscape personnel are using more & more herbicides, such as glyphosate.

As an alternative to, or in combination with mulches, are several pre-emergence herbicides that can be applied between or over the plants to control annual weeds for a period of 4 to 8 weeks. Reapplications are usually necessary to achieve season-long control depending on selection of herbicide, soil and climatic conditions. Typically, the first application should be made prior to weed seed germination and subsequent treatments as needed based on regrowth of annual weeds.

The soil should be weed-free and moist prior to application or the treatment should be followed by rain or irrigation. It's important to know how much area is included in the beds to be treated. Once the area has been calculated, determine the amount of herbicide needed for that area, and apply with equipment that is properly calibrated and in working order. Many types of application equipment are available. Select a sprayer and/or granular applicator that is large enough to complete anticipated needs and is easy to calibrate and clean.

continued on page 58

Calculating rates and quantities

Granular Materials

Example—A landscaper needs to treat 4,000 sq. ft. of Juniper with 4% RONSTAR granules at 4 lbs. aia. How much RONSTAR is required?

Formula

$$\text{lbs. aia} \times \frac{\text{sq. ft. to be treated}}{\text{44,000 sq. ft./acre}} \times \frac{1000}{\text{\% granular}} = \text{lbs. required to treat area}$$

Calculation

$$4 \text{ lbs. aia} \times \frac{4{,}000}{44{,}000} \times \frac{100}{4} = 9.1 \text{ lbs. 4\% granular RONSTAR}$$

Wettable Powders

Example—A landscape firm needs to treat 4,000 sq. ft. with 50% DEVRINOL wettable powder at the rate of 10 lbs. aia.

Formula

$$\text{lbs. aia} \times \frac{\text{sq. ft. to be treated}}{\text{44,000 sq. ft./acre}} \times \frac{100}{\text{\% powder}} = \text{lbs. required to treat area}$$

Calculation

$$10 \text{ lbs. aia} \times \frac{4{,}000}{44{,}000} \times \frac{100}{50} = 1.8 \text{ lbs. 50\% DEVRINOL W.P. to be mixed in enough water to cover 4,000 sq. ft.}$$

Liquid Concentrate

Example—The recommendation is to apply trifluralin at 2 lbs. aia. Since TREFLAN contains 4 lbs. active ingredient/gal., how many gallons should be applied on ½ acre of area to be planted to Purple Wintercreeper.

Formula

$$\text{lbs. aia} \times \frac{\text{sq. ft. to be treated}}{44{,}000} \times \frac{1}{\text{lbs. active ingredient/ gallon}} = \text{gallons required to treat area}$$

Calculation

$$2 \text{ lbs. aia} \times \frac{22{,}000}{44{,}000} \times \frac{1}{4} = .25 \text{ or } \tfrac{1}{4} \text{ gal. TREFLAN to be mixed in enough water to cover } \tfrac{1}{2} \text{ acre}$$

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Landscape

Pre-emergence herbicides for landscape use

There are approximately 18 pre-emergence herbicides registered for the nursery industry but only the 12 listed below are utilized in landscape plantings.

Check the label for sensitive plant materials before using any herbicide. Consider using a drift preventer (cone) for liquid materials to reduce damage to desirable plants and to increase application speed. Bulbs can be affected by many preemergence herbicides. Soil type can reduce effectiveness. Foliage of desirable plants should be dry to prevent granular materials from sticking.

BETASAN, LESCOSAN (Bensulide)—used at the rate of 10-12 lbs. aia to control annual grasses, especially crabgrass, and annual bluegrass in established flower gardens. Use the 12.5% granular formulation (80-96 lbs.), the 3.6% G (278-333 lbs.), or the 4 E formulation at 3⅛ gals./A in 80-100 gals. of water and irrigate after application. This is the only pre-emergence herbicide labelled for use with tulip and daffodil.

CASORON, DYCLOMEC (Dichlobenil)—effectively controls a wide spectrum of annual and perennial grasses and broadleaved weeds when used at 5 to 6 lbs. aia (125-150 lbs. of G-4). CASORON is one of the most effective pre-emergence herbicides against mugwort (wild chrysanthemum), thistle, nutsedge, quackgrass and bindweed, particularly if used for 2 successive years. CASORON is not especially effective in fine sandy soils. It should be incorporated 2-3 inches if the soil temperature is above 45°F, however, no incorporation is necessary if applied in late fall or winter. CASORON may injure fir, spruce, hemlock, certain Japanese hollies, viburnum and most herbaceous plants.

DACTHAL (DCPA)—is used at the rate of 10.5-12.0 lbs. aia in 75% wettable powder (14-16 lbs.) or 5% granular form (210-240 lbs.) to control annual grasses and many broadleaved weeds including dodder. DACTHAL is not effective against wild mustard, ragweed, smartweed, and velvet leaf. It can be safely used with nearly all woody ornamental and many herbaceous crops.

DEVRINOL (Napropamide)—controls annual grasses and broadleaf weeds including chickweed, groundsel, lambsquarters and redroot pigweed. DEVRINOL is applied at the rate of 4-6 lbs. aia in 10% granular form (40-60 lbs.) or 50% WP (8 to 12 lbs. in 50 gals. water). For small areas, apply the 10 G at 15 oz.—1 lb. 6 oz./1000 sq. ft. or the 50 WP at 3 oz. to 4.4 oz./2½ gals. water/1000 sq. ft. DEVRINOL is registered on a wide selection of trees, shrubs, evergreens and ground covers.

continued on page 60

TABLE 1.

Woody plants tolerant to pre-emergence herbicides

The following evergreen and deciduous plants are labeled for use with the pre-emergence herbicides across the top of the chart. An (X) in the column indicates the herbicide can be safely used for that plant listed. The list includes only those plants with company label registration.

	BETASAN	CASORON	DACTHAL	DEVRINOL	ENIDE	EPTAM	FURLOE CHLORO IPC ORNAMENTAL WEEDER	PRINCEP	RONSTAR	SURFLAN	TREFLAN
Narrowleaf Evergreens											
Arborvitae		X	X	X	X		X	X	X	X	X
Chamaecyparis					X	X					
Eastern Red Cedar		X		X	X			X			X
Fir			X	X		X	X				
Fir, Balsam							X	X			X
Fir, Douglas				X				X	X		X
Fir, Fraser								X			
Hemlock				X	X	X	X	X	X		X
Juniper	X	X	X	X	X	X	X	X	X	X	X
Pine			X	X		X	X	X	X		
Pine, Austrian								X	X		X
Pine, Japanese Black									X	X	X
Pine, Mugo								X		X	
Pine, Red								X			X
Pine, Scotch								X	X		X
Pine, White								X	X	X	X
Spruce			X	X		X	X		X		
Spruce, Blue								X		X	X
Spruce, Norway								X	X		X
Spruce, White								X			X
Yew		X	X	X	X	X	X	X	X	X	X
Broadleaf Evergreens											
Boxwood	X	X	X	X		X			X	X	X
Cherry Laurel					X					X	X
Euonymus				X	X		X	X		X	X
Firethorn	X	X		X	X				X	X	X
Holly	X	X	X	X	X	X		X		X	X
Holly, Japanese						X			X	X	X
Japanese Pieris			X			X		X		X	X
Leucothoe		X				X			X	X	
Magnolia grandifolia									X	X	
Mahonia					X		X	X	X	X	
Mountain Laurel		X	X		X		X			X	X
Rhododendron		X	X	X	X	X	X	X		X	X

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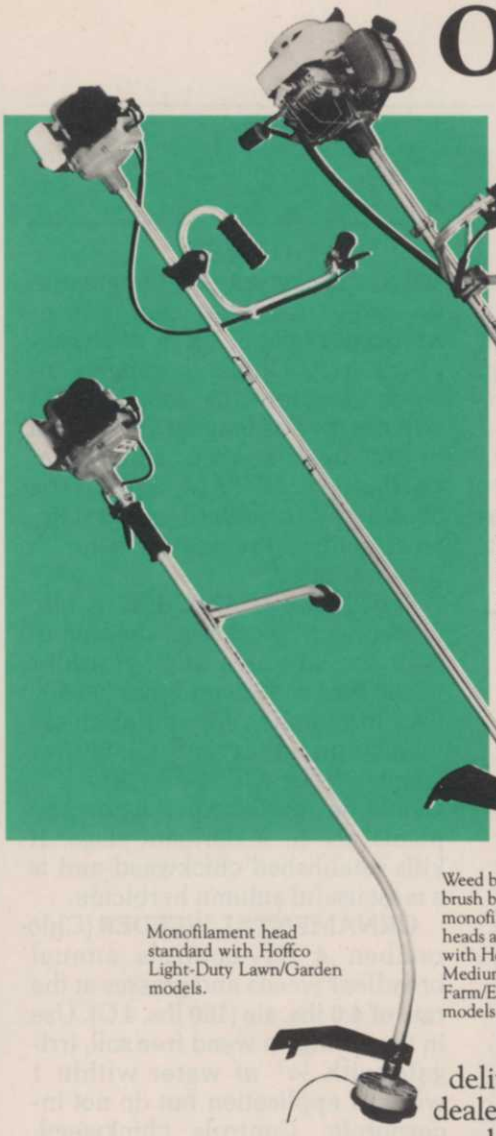

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Landscape

ENIDE (Diphenamide)—is used at the rate of 6-8 lbs. aia (12-16 lbs. 50% WP, 6.6-8.8 lbs. 90% WP) to control annual grasses and broadleaved weeds. ENIDE, available as a 50% and 90% wettable powder, is particularly effective in sandy soils and quite safe on evergreens, deciduous plants, numerous ground covers and flowers.

EPTAM (EPTC)—is available as a 7 EC and 10% granular and can be used to rid an area of certain weeds the season prior to planting. It must be incorporated 2-3" for annual weed control and at least 6" in the soil, preferably by cross discing at 3-6 lbs. aia (30-60 lbs. G-10, 5¾ -7 pts. of 7 EC in 10-50 gal. of water) for the suppression of nutsedge, quackgrass, and certain other weeds. Mugwort can be controlled at 17 pts. of 7 E in 10-50 gals. of water/A. Unless thoroughly incorporated into the soil, EPTAM will not give as long lasting control of broadleaf weeds as many other herbicides. EPTAM should be considered for nutsedge and mugwort control the season prior to planting only.

TABLE 1.

Woody plants tolerant to pre-emergence herbicides

Continued

	BETASAN	CASORON	DACTHAL	DEVRINOL	ENIDE	EPTAM	FURLOE CHLORO IPC	ORNAMENTAL WEEDER	PRINCEP	RONSTAR	SURFLAN	TREFLAN
Deciduous Trees												
Ash		X	X	X	X					X		
Ash, White					X			X				X
Bald Cypress					X							X
Beech					X							
Birch		X	X		X		X			X		
Birch, European												X
Chinese Chestnut			X		X							X
Corktree, Amur		X										
Crabapple		X	X	X	X					X		X
Dogwood		X	X		X	X		X	X	X		X
Dogwood, Kousa												X
Elm		X	X									
Elm, American									X			
Elm, Siberian									X			
Ginkgo										X	X	
Goldenchaintree		X		X								
Goldenraintree		X									X	
Hackberry		X										
Hawthorn			X	X								
Honeylocust				X					X			X
Linden		X				X						
London Planetree		.										X
Magnolia		X	X			X	X	X		X		
Maple		X	X	X	X	X	X					
Maple, Amur										X		
Maple, Norway												X
Maple, Red								X				X
Maple, Silver												X
Maple, Sugar					X							X
Mountain Ash		X										
Oak		X	X		X	X				X		
Oak, Pin												X
Oak, Red								X	X	X		X
Oak, Scarlet												X
Poplar		X	X	X	X		X					
Redbud			X		X							X
Russian Olive		X	X		X				X	X		
Sassafras								X				
Sweetgum			X		X						X	X
Sycamore			X		X							X
Tuliptree			X		X							X
Tupelo												X
Walnut		X	X	X	X							X
Willow		X	X		X							X

PRINCEP (Simazine)—is used from 1 to 3 lbs. aia in the 4% granular (25-75 lbs. G-4), 4 L (1-3 qts.) or 80% wettable powder (1.3-3.8 lbs. 80 W) formulations to control annual and perennial grasses and broadleaf weeds. PRINCEP CALIBER 90, a water dispersible granule, should be used at 2.2-3.4 lbs. of product in 25 gal. water. Princep is effective for 3 months or longer if applied in the spring. PRINCEP will injure birch, euonymus, deutzia, lilac, linden, privet, spirea, and herbaceous plants. Autumn or early winter applications at 2-3 lbs. aia are recommended with a lower rate (1 lbs. aia) suggested for summer use alone or preferably, in combination with

continued on page 62

FURLOE CHLORO-IPC (Chloropropham)—is used at the rate of 6-10 lbs. aia as a 20% granular (30-50 lbs.) or 10% granular (60-100 lbs.) formulation to control chickweed and other annual winter weeds. FURLOE CHLORO-IPC should be applied when landscape plants are in a dormant stage. It kills established chickweed and is a most useful autumn herbicide.

ORNAMENTAL WEEDER (Chloramben 4 G)—controls annual broadleaf weeds and grasses at the rate of 4.0 lbs. aia (100 lbs. 4 G). Use in the spring on weed free soil, irrigate with ½" of water within 1 week of application but do not incorporate. Controls chickweed, crabgrass, foxtails, lambsquarters, mustard, pigweed, ragweed, seedling johnsongrass, smartweed and velvetleaf. Chloramben is more effective in clay loam soil than in sandy soils.

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Landscape

TABLE 2.

Ground covers and flowers tolerant to pre-emergence herbicides

	BETASAN	DACTHAL	DEVRINOL	ENIDE	EPTAM	ORNAMENTAL WEEDER	PRINCEP	RONSTAR	SURFLAN	TREFLAN
Ground covers										
Ajuga	X		X		X			X		
Boston Ivy		X								
Cotoneaster		X		X		X	X	X	X	X
English Ivy	X	X	X	X	X	X		X	X	
Euonymus		X		X		X		X	X	X
Honeysuckle		X		X						X
Juniper	X	X		X		X	X	X	X	X
Liriope			X						X	
Myrtle	X		X	X	X			X	X	
Pachistima		X								
Pachysandra	X		X		X			X		
Potentilla										X
Sedum	X				X			X		
Stonecrop									X	
St.John's Wort	X		X	X	X					
Flowers										
Achillea			NOT REGISTERED FOR FLOWERS				NOT REGISTERED FOR FLOWERS	NOT REGISTERED FOR FLOWERS		X
Ageratum		X			X					X
Alyssum	X	X		X	X					
Amaranthus					X					
Aster	X	X		X	X					X
Baby's Breath		X		X						
Bachelor's Button	X									
Balsam					X					X
Begonia				X	X				X	
Bell Flower		X								
Bleeding-Heart		X								
Bugloss		X								
Calendula	X									X
California Poppy										X
Calliopsis										X
Campanula	X									
Candle Larkspur		X								
Candytuft	X	X								
Carnation										X
Celosia						X				
Centaurea										X
Chrysanthemum		X		X	X	X			X	X
Coleus		X								
Columbine		X								
Coral Bells	X	X								
Coreopsis		X								
Cosmos		X								X
Daffodil	X									
Dahlia	X	X		X	X	X				X
Daisy	X									
Daylily					X	X				
Delphinium		X		X						
Dianthus					X					X
Evening Primrose		X								
Fernleaf Yarrow		X								
Feverfew		X		X						
Forget-Me-Not		X								X
Four-O'Clock		X								X
Foxglove		X		X						
Gaillarida		X								X
Gazania	X								X	

continued

DACTHAL, DEVRINOL, ENIDE, or SURFLAN.

RONSTAR (2 G), **PRO GROW ORNAMENTAL HERBICIDE 1** (4 G) (Oxadiazon)—labelled for the control of many annual grasses and broadleaved weeds in trees, shrubs, vines and ground covers. This material is effective in controlling bittercress, common groundsel, galinsoga, Pennsylvania smartweed, yellow woodsorrel (oxalis) and barnyardgrass but not chickweed. Apply at 4.0 lbs. aia (100 lbs./A of the 4% G or 200 lbs./A of the 2% G formulation). Avoid application to wet foliage to prevent granules from attaching to the leaves and causing phytotoxicity.

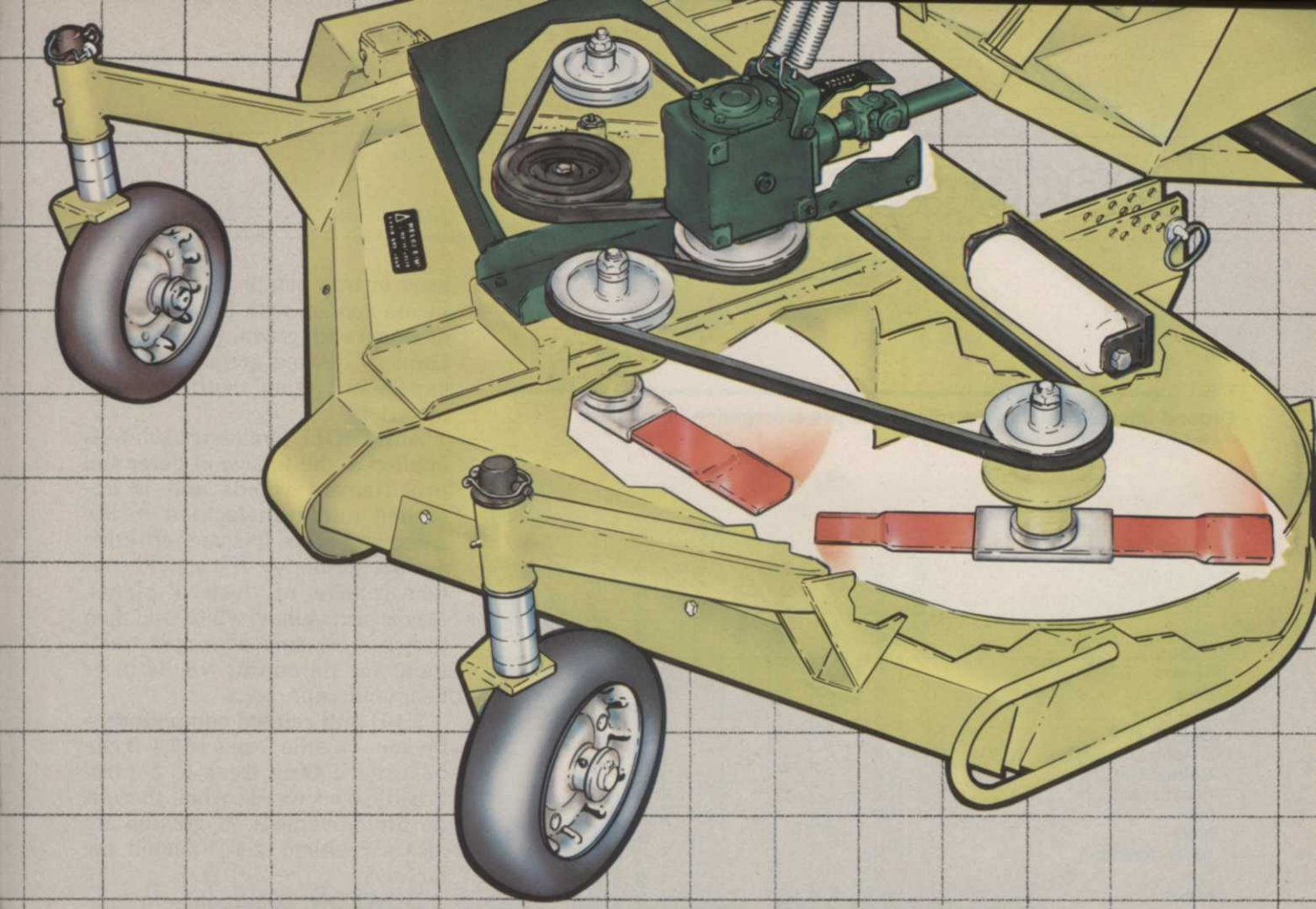
SURFLAN (Oryzalin)—for use in landscape plantings to control annual grasses, chickweed, purslane, lambsquarters and pigweed. Apply at the rate of 2.0-4.0 aia (2⅔-5⅓ lbs. of 75% WP in 20-40 gals. of water) on established plants. This herbicide is labeled for numerous shrubs, evergreens, ground covers, and flowers. SURFLAN is similar to TREFLAN but does not require incorporation and can be used in existing plantings of most ornamentals. One-half inch of water is necessary to activate the herbicide following application.

TREFLAN (Trifluralin)—is primarily used as a pre-plant treatment to control annual grasses and some broadleaf weeds. The 5% granular and 4 lbs. emulsifiable concentrate forms are used 1-4 lbs. aia (20-80 lbs. G-4, 1.4 qts. EC) and must be incorporated 2-3 inches into the soil. Effectiveness is increased if shallow (½-2") cultivation follows application by 2-3 weeks.

Post-emergence herbicides for landscape use

Post-emergence herbicides are used for general weed clean-up around buildings, waterways, fence rows, etc. Used with extreme caution, these materials may be

continued on page 64



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Circle No. 112 on Reader Inquiry Card

TABLE 2.

Ground covers and flowers tolerant to pre-emergence herbicides

Continued

	BETASAN	DACTHAL	DEVRINOL	ENIDE	EPTAM	ORNAMENTAL WEEDER	PRINCEP	RONSTAR	SURFLAN	TREFLAN
Flowers										
Geranium		X		X					X	
Gladiolus	X	X								X
Gold Dust		X								
Golden Marguerite		X								
Golden Tuft		X								
Impatiens									X	
Iris		X				X				
Ixora										X
Lavendercotton		X								
Lily		X								
Lobelia				X						X
Lupine		X								X
Marigold	X	X		X	X	X			X	X
Morning Glory		X								
Mother-of-Thyme		X								
Nasturtium		X			X					X
Nicotiana										X
Pansy	X				X				X	
Peony		X		X		X				
Periwinkle										X
Petunia		X		X	X				X	X
Phlox				X						X
Pink Heath		X								
Pinks		X								
Poker Plant		X								
Portulaca										X
Primrose	X									
Purple Cone Flower		X								
Ranunculus	X									
Rudbeckia										X
Salvia		X		X						X
Scabiosa										X
Scarlet Sage		X								
Shasta Daisy				X						X
Snapdragon		X		X		X				X
Snow on the Mountain										X
Stock				X						X
Stone Crop		X								
Strawflower		X								
Sundrops		X								
Sunflower		X								X
Sweet Alyssum										X
Sweet Pea	X	X								X
Sweet William				X						X
Tulip	X									
Verbena		X		X						
Violet		X								
Virginia Spiderwort		X								
Wall Flower	X									
Wormwood		X								
Zinnia	X	X		X	X	X			X	X

NOT REGISTERED FOR FLOWERS — DEVRINOL

NOT REGISTERED FOR FLOWERS — PRINCEP

NOT REGISTERED FOR FLOWERS — RONSTAR

continued

used in tree plantings. Avoid herbicide contact with foliage, trunks or stems with green, yellow or red tissue of desired crops as damage can result from each of these materials.

AMITROLE (amino triazole)—is applied to the foliage of perennial broadleaved weeds and is absorbed and translocated to the stems and roots. It is very effective against poison ivy. If it should contact foliage of desired plants, leaves turn yellow, white, and then brown. Use only as a spot treatment for perennial weeds in or near landscape crops.

2,4-D and related compounds—the non-volatile forms of 2,4-D can be used among trees to control broadleaved weeds when there is no air movement. If grasses are also a problem, 2,4-D should not be used.

DOWPON (Dalapon)—in non crop areas, is recommended for control of quackgrass at the rate of 10-15 lbs. aia (13-19.5 lbs. of commercial product) and plowed down 10-14 days later. This treatment will also control common reed and cattails. DOWPON is available as an 85% wettable powder.

PARAQUAT—is used at the rate of .5 to 1.0 lb. aia or 1 to 2 qts. of the commercial formulation per sprayed acre for control of annual weeds and grasses and for top kill of perennial weeds and grasses around the base of trees. Avoid use on green barked trees including littleleaf linden. Repeat applications, as necessary, to control newly germinated seedlings and to control regrowth of perennials. A surfactant should be used. There is no soil residue. Use protective clothing and gloves while handling the concentrate to avoid contact with skin. PARAQUAT is a restricted use pesticide.

RAD-E-CAT 25 or **PHYTAR 560** (Cacodylic Acid)—is used to control annual and perennial weeds around trees, for lawn renovation,

continued on page 66

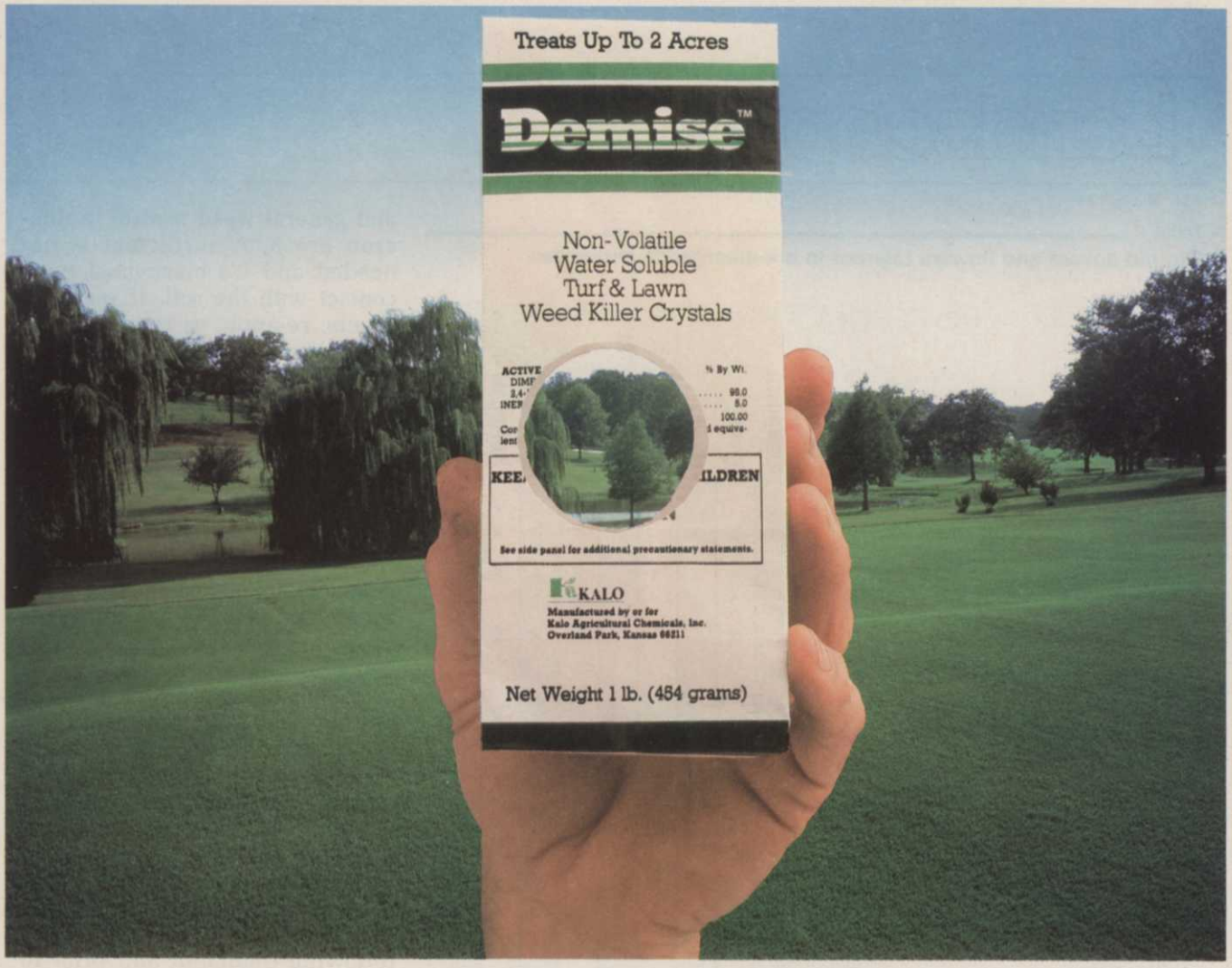

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TABLE 2.

Ground covers and flowers tolerant to pre-emergence herbicides

Continued

	BETASAN	CASORON	DACTHAL	DEVRINOL	ENIDE	EPTAM	FURLOE CHLORO IPC	ORNAMENTAL WEEDER	PRINCEP	RONSTAR	SURFLAN	TREFLAN
Deciduous Shrubs												
Abelia	X		X	X							X	
Azalea	X	X	X	X	X	X		X		X	X	X
Azalea, Mollis		X										
Barberry		X	X		X	X	X		X	X	X	X
Beautybush		X			X							
Cinquefoil												X
Cotoneaster		X	X		X			X	X	X	X	X
Currant			X		X							
Deutzia		X										X
Dogwood, Red Osier										X		
Euonymus, Winged		X	X	X	X	X				X	X	X
Flowering Almond		X										
Flowering Quince		X										
Forsythia		X	X		X		X			X	X	X
Hibicus				X	X						X	
Honeysuckle		X	X		X		X		X	X	X	X
Hydrangea			X		X		X					
Hypericum				X	X							
Lilac		X	X		X	X	X			X	X	X
Mockorange		X	X		X		X				X	
Mockorange, Lemoine												X
Nandina		X		X					X			
Peashrub		X										
Photinia		X		X							X	
Privet	X	X	X	X	X		X			X	X	X
Rose		X	X	X	X		X	X		X	X	X
Spirea		X	X		X		X	X				
Spirea, Vanhoutte												X
Viburnum			X		X	X	X	X		X		X
Viburnum, Doublefile											X	
Weigela		X	X		X							

and general weed control in non-crop areas. A surfactant is not needed and it's inactivated upon contact with the soil. If regrowth occurs, re-apply as required. Apply at the rate of 3 gallons per acre.

ROUNDUP (Glyphosate)—controls annual and perennial weeds when used prior to planting and in established ornamentals. Registered as a directed spray toward the base of arborvitae, azalea, boxwood, crabapple, euonymus, fir, Douglas fir, holly, lilac, magnolia, maple, oak, privet, pine, spruce and yew. To control weeds apply to actively growing grasses and broadleaf weeds. Use 1 qt./A in 10-40 gallons of water if weeds are less than 6 in. tall. Apply 2-3 qts./A to control Canada thistle and 3-4 qts. for field bindweed control. Most effective control of perennial weeds is obtained when weeds are in the flower bud or bloom stage at treatment. There is no soil residue, however, a waiting period of 3-5 days, is necessary, following treatment and prior to tillage to obtain maximum weed control.

COMBINATION TREATMENTS—of post-emergence with pre-emergence herbicides are used to kill existing weeds and prevent emergence of others. The

continued on page 70

Lawn grass tolerance to herbicides in Georgia. (B.J. Johnson, Univ. of Georgia)

	Herbicides								
Turfgrasses	Benefin	DCPA	Bensulide	Oxadiazon	Atrazine	DSMA MSMA	2,4-D[1]	Paraquat	Glyphosate
Bermuda	T	T	T	T	S*	T	T	S*	S*
Zoysia	T	T	T	T	S*	S-I	T	S	S
Centipede	T	T	T	T	T	S	S*	S	S
St. Augustine	T	T	T		T	S	S	S	S
Tall fescue	T	T	T	T	S	T	T	S	S
Bahia	T	T	T		S-I	S-I	T	S	S

T = Tolerance; safe to use herbicide at recommended rates.
S = Sensitive; Do not use this herbicide.
S-I = Intermediately tolerant; use herbicide with care since grass may be injured.

*Tolerant to herbicides when turfgrass is dormant.

[1]Includes mecoprop and/or dicamba.

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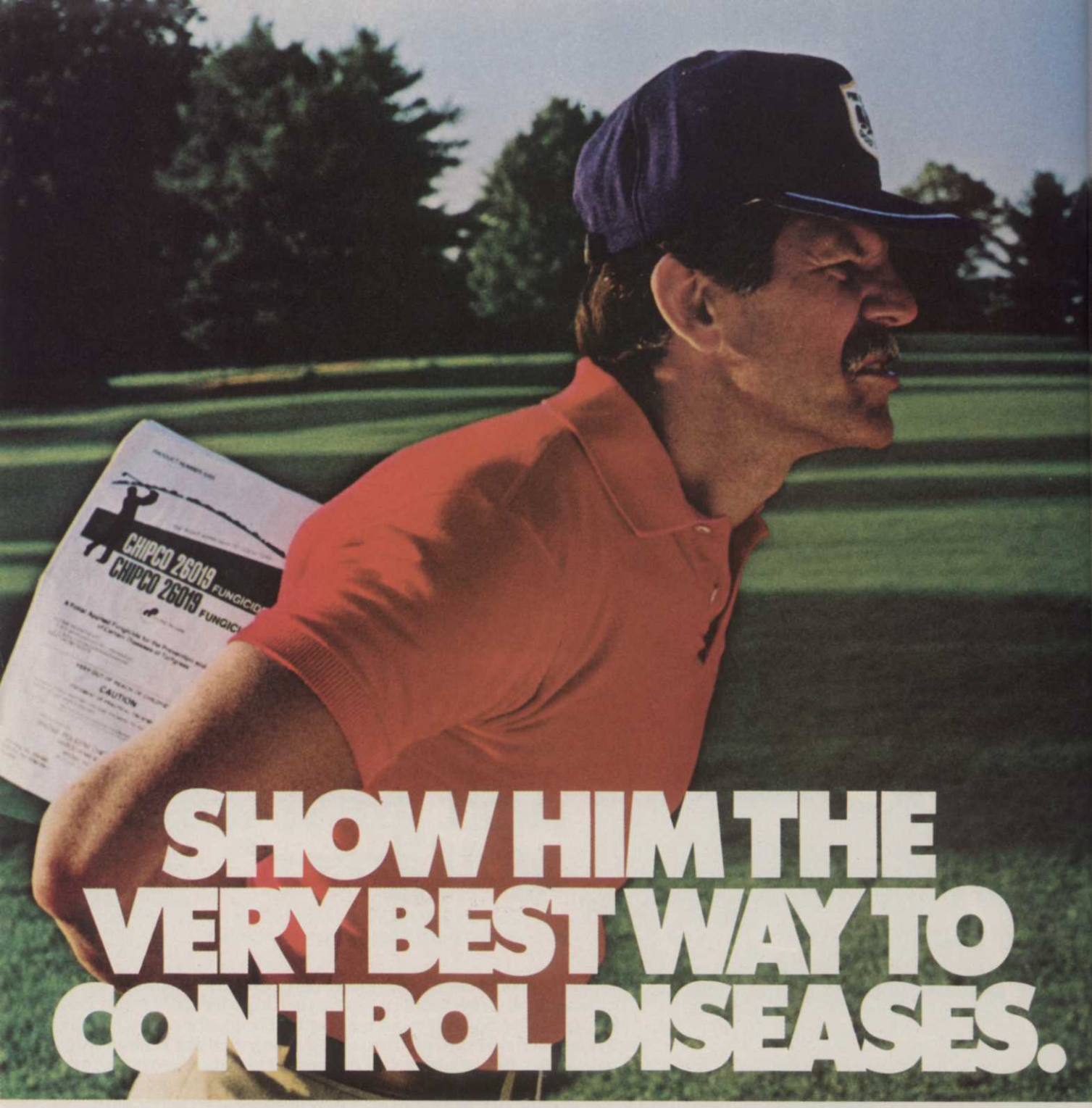

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Weed Identification Quiz

Quiz yourself. Answers are on the next page.

A. _____

F. _____

E. _____

G. _____

J. _____

K. _____

L. _____

M. _____

Q. _____

R. _____

S. _____

B. _____

C. _____

D. _____

H. _____

I. _____

N. _____

O. _____

P. _____

T. _____

U. _____

V. _____

W. _____

TABLE 3.
Weeds controlled by pre-emergence herbicides

The following list of grasses and broadleaf weeds are labeled as being controlled by the pre-emergence herbicides. An (X) in the column indicates the weed is controlled for the herbicide listed.

	BETASAN	CASORON	DACTHAL	DEVRINOL	ENIDE	EPTAM	FURLOE CHLORO IPC	ORNAMENTAL WEEDER	PRINCEP	RONSTAR	SURFLAN	TREFLAN
Grasses												
Annual Bluegrass	X	X	X	X	X	X	X		X	X		X
Barnyardgrass	X		X	X	X	X	X		X	X	X	X
Bermudagrass						X						
Cheat (Chess)				X	X							X
Crabgrass	X	X	X	X	X	X	X	X	X	X	X	X
Downy Bromegrass				X			X		X			X
Fall Panicum	X			X	X	X			X	X	X	X
Foxtail	X	X			X			X	X		X	X
Bristly Foxtail				X							X	X
Giant Foxtail				X		X					X	X
Green Foxtail			X	X		X				X	X	X
Yellow Foxtail			X	X		X					X	X
Goosegrass	X		X	X	X	X			X		X	X
Johnsongrass (from seed)			X	X	X	X		X			X	X
Nutsedge						X						
Quackgrass		X				X						
Ryegrass (annual)				X	X	X	X		X			
Sandbur			X		X	X						X
Stinkgrass (lovegrass)			X	X	X	X	X					X
Wild Oats				X		X	X		X		X	
Witchgrass		X	X		X	X	X		X			
Broadleaf Weeds												
Annual Morningglory						X			X			
Carpetweed		X	X	X	X	X	X		X	X	X	X
Chickweed		X	X	X	X	X	X	X	X		X	X
Common Groundsel				X			X		X	X	X	
Dandelion		X										
Deadnettle (Henbit)	X	X				X			X			X
Dodder			X				X					
Dogfennel		X										
Evening Primrose		X								X		
Galinsoga										X		
Knotweed		X		X	X		X					X
Lambsquarters	X	X	X	X	X	X	X	X	X	X	X	X
Lesser Bittercress											X	
Mugwort (Chrysanthemum Weed)		X				X						
Mustards		X						X	X			
Nightshades						X			X			
Peppergrass		X			X				X			
Pigweed					X			X	X		X	X
Prostrate Pigweed						X					X	X
Redroot Pigweed	X	X	X	X		X				X	X	X
Tumble Pigweed						X						
Plantain		X										
Prickly Lettuce				X								
Prickly Sida						X						
Purslane		X	X	X	X	X	X		X	X	X	X
Ragweed		X		X		X		X	X			

continued

combinations below have been used extensively in trees with excellent success.

PARAQUAT at 1-2 qt./A plus *PRINCEP* 80 W 1-2 lbs. aia (1.3-2.5 lbs.) Use as a directed spray and treat regrowth as needed with PARAQUAT only. Avoid contact with foliage and green, yellow or immature bark.

RAD-E-CATE or *PHYTAR 560* at 3 gal./A plus *PRINCEP* 80 W 1-2 lbs. aia (1.3-2.5 lbs.) can be used in the same way as PARAQUAT and PRINCEP with the same precautions.

ROUNDUP at 1-3 qts./A plus *SURFLAN* 75 W at 2 ½-5 ⅓ lbs. is labelled for use on crops which appear on both labels.

continued on page 76

ANSWERS TO PHOTO QUIZ

A. Mouse-ear chickweed
B. Crabgrass
C. Yarrow
D. Goosegrass
E. Prostrate knotweed
F. Creeping speedwell
G. Dandelion
H. Goosegrass
I. Broadleaved plantain
J. Perennial white clover
K. Yellow nutsedge
L. Annual bluegrass
M. Tall fescue
N. Buckhorn plantain
O. Corn speedwell
P. Red sorrel
Q. Mugwort
R. Nutsedge
S. Heal-all
T. Prostrate spurge
U. Black medic
V. Ground ivy
W. Oxalis

Photos courtesy of New York State Turfgrass Association.

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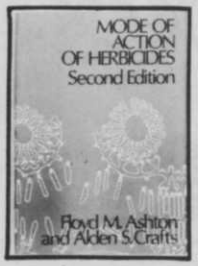

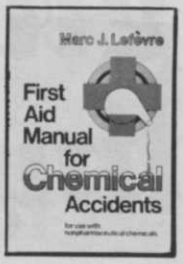

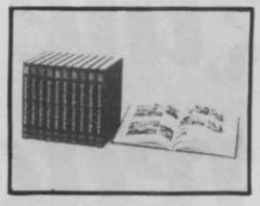

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TABLE 3.

Weeds controlled by pre-emergence herbicides

Continued

	BETASAN	CASORON	DACTHAL	DEVRINOL	ENIDE	EPTAM	FURLOE CHLORO IPC	ORNAMENTAL WEEDER	PRINCEP	RONSTAR	SURFLAN	TREFLAN
Broadleaf Weeds												
Red Sorrel					X		X					
Shepherdspurse	X	X			X	X			X			
Smartweed (Pennsylvania)		X			X		X	X	X	X		
Sow Thistle				X							X	
Speedwell			X						X	X		
Spurge, Leafy		X										
Spurge, Petty		X	X							X		
Spurge, Prostrate											X	
Thistle, Bull		X										
Thistle, Canada		X										
Timothy		X										
Velvetleaf								X				
Wild Aster		X										
Wild Carrot		X										
Yellow Rocket		X								X		
Yellow Woodsorrel (Oxalis)		X										

Precautions

Read the entire label on the container.

All directions and safety precautions should be followed, store herbicides in closed, clearly-labelled, original containers, in dry places, out of the reach of children and pets.

If herbicides are spilled on the skin, wash thoroughly with soap, if herbicides are swallowed, come in contact with the eyes or are absorbed to the point of showing symptoms, call a doctor immediately.

Emergency first aid directions and the telephone number of the nearest Poison Control Center should be posted in a conspicuous place in the workshop and in the truck.

Herbicide Manufacturers

The Anderson's
PO Box 119, Illinois Ave.
Maumee, OH
419-893-5050

BASF Wyandotte Corp.
100 Cherry Hill Rd.
Parsippany, NJ 07054
201-263-3400

BFC Chemicals Inc.
4311 Lancaster Pike
PO Box 2867
Wilmington, DE 19805

Ciba Geigy Corp.
PO Box 11422
Greensboro, NC 27409
919-292-7100

W.A. Cleary Chemical Corp.
1049 Somerset St.
Somerset, NJ 08873
201-247-8000

Crystal Chemical Co.
1525 N.
Post Oak Rd.
Houston, TX 77055

Diamond Shamrock
1100 Superior Ave.
Cleveland, OH 44114
216-694-5000

Dow Chemical USA
PO Box 1706
Midland, MI 48640
517-636-0968

Drexel Chemical Co.
2487 Pennsylvania
PO Box 9306
Memphis, TN 38109
901-774-2132

E.I. du Pont de Nemours
Wilmington, DE 19898
302-774-2132

Elanco Products Co.
730 S. Alabama St.
Indianapolis, IN 46285
317-261-3638

PBI Gordon Corp.
300 S. Third St.
Kansas City, KS 66118
816-421-4070

Hopkins Ag. Chemical Co.
PO Box 7532
Madison, WI 53707
608-222-0624

Lakeshore Eqpt. & Supply Co.
300 So. Abbe Road
Elyria, OH 44035
216-323-7544

Mallinckrodt Inc.
3600 N. Second St.
St. Louis, MO 63147
314-982-5043

MoBay Chemical Corp.
Box 4913
Hawthorn Rd.
Kansas City, MO 64120
816-242-2000

Monsanto
800 N. Lindbergh Blvd.
St. Louis, MO 63166
314-694-1000

Nor-Am Ag. Products
350 W. Shuman Blvd.
Naperville, IL 60540
312-961-6500

Ortho Div.
Chevron Chemical Co.
575 Market St.
San Francisco, CA 94105

Pennwalt Corp.
Three Parkway
Philadelphia, PA 19102
215-587-7000

PPG Industries Inc.
One Gateway Center
Pittsburgh, PA 15222
412-434-2252

Rhone Poulenc Chemical Co.
Box 125
Black Horse Lane
Monmouth Junction, NJ 08852
201-297-0100

Rohm & Haas Co.
Independence Mall West
Philadelphia, PA 19105
215-592-3000

Stauffer Chemical Co.
Ag. Chem Div.
Westport, CN 06880
203-222-3000

Thompson Hayward
5220 Speaker Rd.
Kansas City, KS 66101
913-321-3131

TUCO Div., Upjohn
9823-190-45
Kalamazoo, MI 49001
616-385-6609

Union Carbide, Ag. Prod. Co.
7825 Baymeadows Way
Jacksonville, FL 32216

Velsicol Chemical Corp.
341 E. Ohio
Chicago, IL 60611
314-670-4665

Vineland Chemical Co.
W Wheat Rd.
PO Box 745
Vineland, NJ 08360

WTT

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Prograss Lawn Service
Field Representative and licensed applicator.

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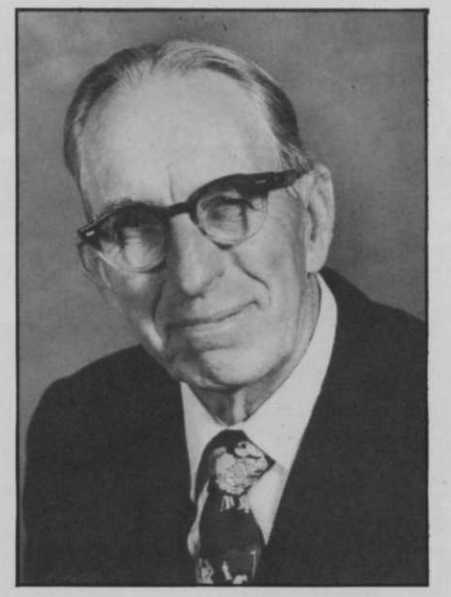
YTP JOB #4780

THE LITTLE GOLF COURSE

Smaller Courses May Hold Golf's Future

By BILL LYONS
The Lyon's Den, Canal Fulton, OH



Bill Lyons

The U.S. Government classifies a small business as one having fewer than 500 employees. With that in mind, the number of golf course operations topping that 500 figure could be counted on one's fingers.

Figures are hard to find on the dollar volume of business that the small courses do annually. For our purposes, we will say a "little" golf course is one doing less than $250,000 a year gross. Perhaps it is a 9-hole, a short, executive style course, a par three or a regulation 18 or 27 hole course.

The Small Business Administration says that the 10.9 million small businesses in the USA averaged only 2.6 percent profit based on the latest figures to date. On a $¼ million gross at 2.6 percent, that would equal $6,500; not much net profit for the little golf course whose market value may be two to four times its gross.

The little golf course is usually a family operation of less than 500 acres. These often independent people are not prone to join an organization serving their mutual needs unless they can see some financial benefit. This was true of the Michigan Owners Association which had 70 members before it came up with an insurance program that saved each course member thousands of dollars each year.

Perhaps we should look at ourselves and ask why we are not an organized group. The NGF tried to bring us together but their programs are geared to the golf industry minus the little courses.

The GCSAA does not want us. After paying my dues for many years I was told by some of its members I was not welcome because I had opened a little course. They had no classification for an owner.

The PGA so far has nothing to offer the little courses. They have come up with no programs to date that will benefit the little course.

The 50 or more turf management schools have failed to teach sound business management. Our study of their products shows they would rather mow grass than push a pencil. Record-keeping takes thinking.

By conservatively observing, it appears ¼ of all golf courses are little ones. They are a vital part of the golf industry. Their merchandising sales are falling off. Most now sell only the eye-catching items—balls, gloves, tees and caps.

> "The little course is a tax-paying entity not a tax consumer."

"Golf is a selective game," says Herb Graffis, "attracting selective people to it."

There is still some status to playing golf. The little course gives selective people in small communities a place to improve their status. Then, too, as Graffis says, "The little course helps make America beautiful."

continued on page 80

There's always a leader the others try to match...

That's the unmatched story of Toro Super 600® sprinklers

When we introduced our Super 600 pop-up sprinklers a couple of years ago, we felt we had a winner. But we waited for *your* judgment ...and the verdict came in fast. You quickly made Super 600 your first choice among all low-pressure large-radius pop-up heads. Now, thoroughly tested and proved in the field, the Super 600 stands alone as the one the *others* would like to be. For lots of good reasons:

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Toro Super 600...versatile, reliable, proven in the field. No wonder the others try to match it. No wonder they *can't!*

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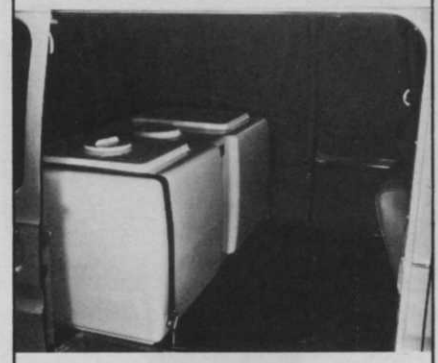
PC20810BM PC200 gallon capacity spray tank with Bean Piston Pump Sprayer (10 GPM 500 PSI). Shown van mounted through rear door of van (above) and through side door of van (below).



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Florida residents call collect 305-785-6402
Outside Florida 1-800-327-9005

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Circle No. 160 on Reader Inquiry Card

SMALLER COURSES

continued from page 78

The little course is a tax-paying entity not a tax consumer. The course is overtaxed compared to adjoining farm property. Yet, it's been shown, it improves tax valuation of all housing within a five mile area.

There are 17 of these little courses in our area alone. Too many? There is one for each 18,000 in population. Yet, just because they are all so well manicured they still produce a livelihood for their owners.

> "Perhaps we should look at ourselves and ask why we are not an organized group."

What each course offers is different and unique. The little course cannot supply "high speed" turf that is advocated by the USGA and the pros for their tournaments. But the little courses do provide a pleasant setting for golfers to enjoy their sport year after year.

When Bob Toskie was in Cleveland this past fall, he said more small golf courses are needed for youth to grow on. Arnold Palmer was quoted in Golf Management magazine as saying, "Kids need a (little) golf course as accessible as a ball diamond." I agree with this, but who will make it free to them? It costs more to maintain one small putting green than several ball diamonds.

Many of the little courses are doing more than their bigger counterparts to promote junior golf. Many children who started playing the little courses 20 years ago are now country club members. Others, who have moved away, are playing one someone else's course.

Once I had the honor of addressing the Golf Course Architects Society on the little course subject. None of them took my suggestion to build "push-up" little courses with low maintenance costs. Maybe they felt it would be unethical. Yet, America needs that kind of course.

Around April 10, as always, we will mail out a free nine holes to

continued on page 82

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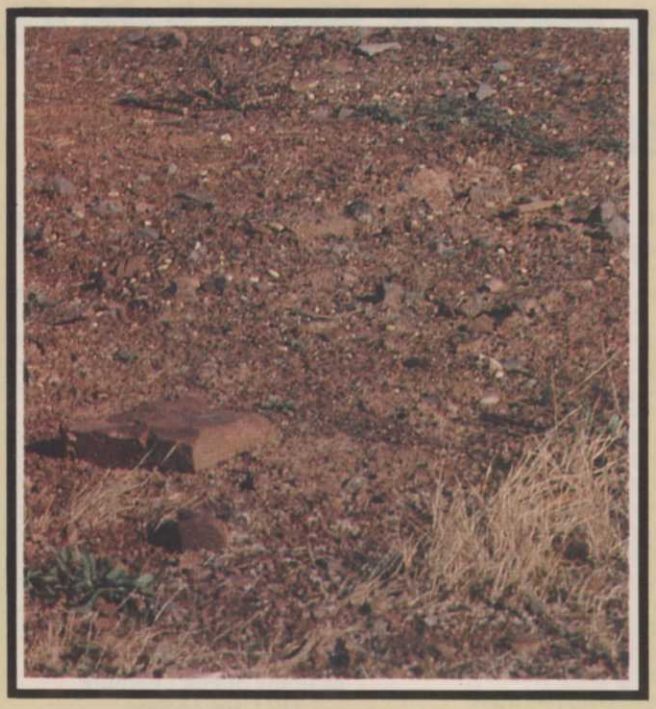
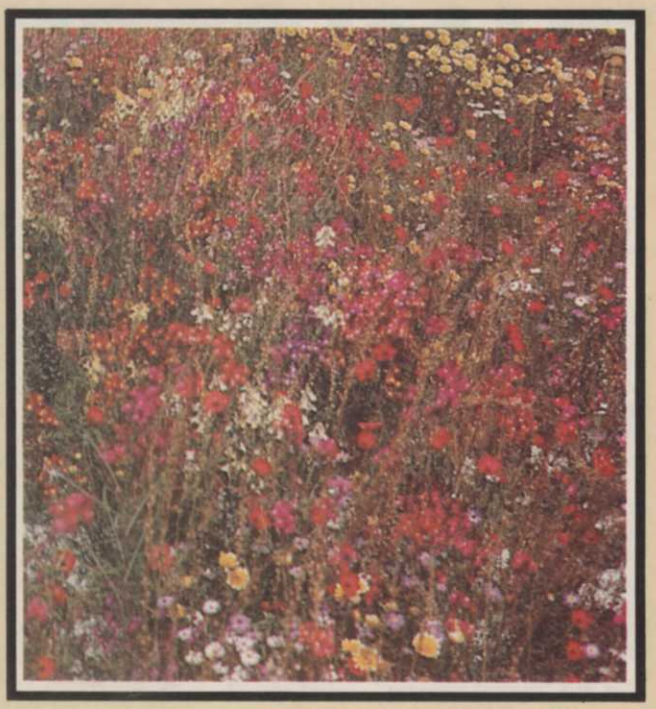
Create a Colorful Difference





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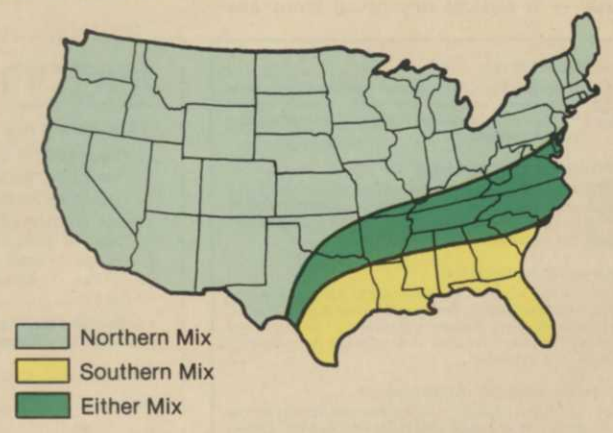
Pinto Wild Flower Mix: the easy, low-maintenance way to naturalize your surroundings.



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Do you have too much to read and too little time to read it? Do you mentally pronounce each word as you read? Do you frequently have to go back and re-read words or whole paragraphs you just finished reading? Do you have trouble concentrating? Do you quickly forget most of what you read?

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Not just "speed reading" — but speed reading-thinking-understanding-remembering-and-learning

The new *Speed Learning Program* shows you step-by-proven-step how to increase your reading skill and speed, so you understand more, remember more and use more of everything you read. The typical remark made by the 75,000 slow readers who completed the *Speed Learning Program* was: "Why didn't someone teach me this a long time ago?" They were no longer held back by the lack of skills and poor reading habits. They could read almost as fast as they could think.

What makes Speed Learning so successful?

The new *Speed Learning Program* does not offer you a rehash of the usual eye-exercises, timing devices, costly gadgets you've probably heard about in connection with speed reading courses or even tried and found ineffective.

In just a few spare minutes a day of easy reading and exciting listening, you discover an entirely new way to read and think — a radical departure from anything you have ever seen or heard about. Research shows that reading is 95% *thinking* and only 5% eye movement. Yet most of today's speed reading programs spend their time teaching you rapid eye movement (5% of the problem) and ignore the most important part (95%) *thinking*. In brief, *Speed Learning* gives you what speed reading *can't*.

Imagine the new freedom you'll have when you learn how to dash through all types of reading material *at least* twice as fast as you do now, and with greater comprehension. Think of being able to get on top of the avalanche of newspapers, magazines and correspondence you have to read . . . finishing a stimulating book and retaining facts and details more clearly and with greater accuracy than ever before.

Listen-and-learn at your own pace

This is a practical, easy-to-learn program that will work for you — no matter how slow a reader you think you are now. The *Speed Learning Program* is scientifically planned to get you started quickly . . . to help you in spare minutes a day. It brings you a "teacher-on-cassettes" who guides you, instructs, encourages you, explaining material as you read. Interesting items taken from *Time* Magazine, *Business Week*, *Wall Street Journal*, *Family Circle*, *N.Y. Times* and many others, make the program stimulating, easy and fun . . . and so much more effective.

Executives, students, professional people, men and women in all walks of life from 15 to 70 have benefited from this program. Speed Learning is a fully accredited course . . . costing only 1/5 the price of less effective speed reading classroom courses. Now you can examine the same, easy, practical and proven methods at home . . . in spare time . . . without risking a penny.

Examine Speed Learning FREE for 15 days

You will be thrilled at how quickly this program will begin to develop new thinking and reading skills. After listening to just one cassette and reading the preface you will quickly see how you can achieve increases in both the speed at which you read and in the amount you understand and remember.

You must be delighted with what you see or you pay nothing. Examine this remarkable program for 15 days. If, at the end of that time you are not convinced that you would like to master Speed Learning, simply return the program and owe nothing. See the coupon for low price and convenient credit terms.

Note: Many companies and government agencies have tuition assistance plans for employees providing full or partial payment for college credit programs.

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SMALLLER COURSES

continued from page 80

over 1,000 of our customers who played 10 or more nine holes with us the year before. If each of the 3,000 or more little courses served that many people, it would amount to a sizeable part of the golf industry.

Some of you many have lived through the "old" depression of the '30s and '40s when many courses, both big and little, closed. Play sold for 25 cents for 18 holes or 50 cents for all day. A family membership for a year could be had for four bags of fertilizer for the course. Even in those hard times, some 5,000 courses weathered the tide.

As the financial depression of the '80s worsens, golfers used to playing on large courses and paying exorbitant greens fees, will be looking to the little courses to play. A promising young executive living the good life as a family country club member suddenly joines the ranks of the unemployed. One of the first moves to economize is to cancel the country club membership. But give up golf? No. They will be using the smaller courses.

Can the little course survive the worst world-wide financial collapse in history? Wise managers say it can, but only after careful evaluation of the following points:

1. Reevaluate every employee from the front office to the garbage collector. Each has an important job to do efficiently.
2. Check those important records on a percentage basis of income to find the weak spots.
3. Evaluate maintenance practices with the goal of a healthier, more attractive turf. It wins customers.
4. Test sales programs. How can the weakest be improved? Thinking is hard work, but it can earn more money in the longrun.
5. Join golf owners associations for an exchange of ideas. Nobody has all the answers, but if you join your local association, you may learn some valuable things. James L. Holmes, now of Brian, TX, preached the following as a traveling agronomist with the USGA. "Charge more and you will get more customers." Our little course has done that for 20 years and it works. **WTT**

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LANDSCAPE UPDATE *from page 14*

Winner for Small Residential was Live Oak Landscape, Modesto the Welch residence, Modesto.

An Achievement Award was presented to Valley Landscaping, Bakersfield for the Costa residence, Bakersfield.

Medium Residential was won by G.N. Landscaping, Monterey Park, for Highland Beauty, Rowland Heights. Achievement Award went to Horie Landscape, Vista for the Ishino residence, San Diego.

Large Residential was received by Heritage Landscape, Inc., Granada Hills, for the Jones residence, Chatsworth. Achievement Award was given to Yamasaki Nursery, Auburn for Rennecke Garden, Fair Oaks.

For Custom Residential, the winner was Creative Landscaping Concepts, Granada Hills, for the Peisner residence, Chatsworth.

The Residential Estate award was given to Zierden Waterfalls, Sacramento for the Ackers residence, Rancho Murieta. The Achievement Award was given to Carl's Landscaping, Inc., Laguna Hills, for Sutton residence, Laguna Hills.

The Small Renovation Award was presented to Blomquist & Sons, North Hollywood, for A. Blomquist residence, Chatsworth. Achievement Award was given to Richard Cohen Landscape and Construction, Inc., Mission Viejo, for the Windham residence, Laguna Beach.

The Large Renovation award was won by Creative Gardens, Inc., Los Angeles, for the Meyer residence, Sherman Oaks. The Achievement Award honored Landscape Management Associates, Corte Madera, for the Badham residence, Kentfield.

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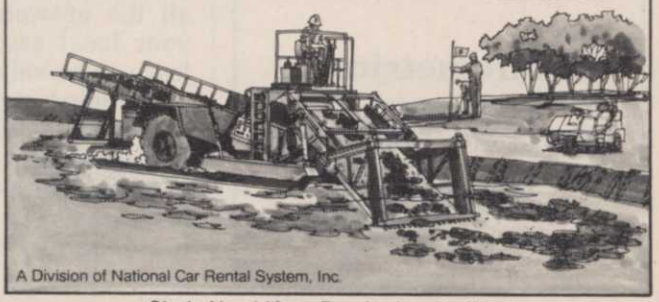

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went to Art Torres Landscaping Inc., Encinitas, for the Cantebria models, Encinitas and the Diamante Blanca models, San Diego.

The Small Commercial Living/Industrial award was given to Makoto Landscape Co., Oceanside, for Escondido professional Center, Escondido. The Achievement Award was given to McGuire Earth Works, Orangevale, for California Liquid Gas Corp., Sacramento.

The Medium Commercial Living/Industrial Award was won by Leek Landscaping, Fair Oaks, for River Rock Plaza, Folsom. The Achievement Award was given to Truxell & Valentino Landscape Development, Sanger, for Bullard & Marks Professional Center, Fresno.

The Large Commercial Living/Industrial award was given to Anthony Bertotti Landscaping, Inc., Novato, for the Harvest Inn, St. Helena. Heath Landscaping, Carmichael, won the Achievement Award for Water Tower Plaza in Sacramento.

The Public Works award was earned by Fries Landscape Co., Escalon, for March Lane median strip, Stockton. The Achievement Award was won by American Landscape, Inc., Canoga Park, for First Street & Los Angeles Avenue median island, Simi Valley.

The commercial Irrigation Award went to Valley Landscaping, Bakersfield, for McDonalds White Lande, Bakersfield.

The Condominium/Townhouse category was won by Yamasaki Nursery, Auburn, for Southridge Townhomes, Auburn. The Achievement Award went to Heritage Landscape, Inc., Granada Hills for Palm Village Townhomes, Burbank.

Continued on page 86

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And more golf courses.

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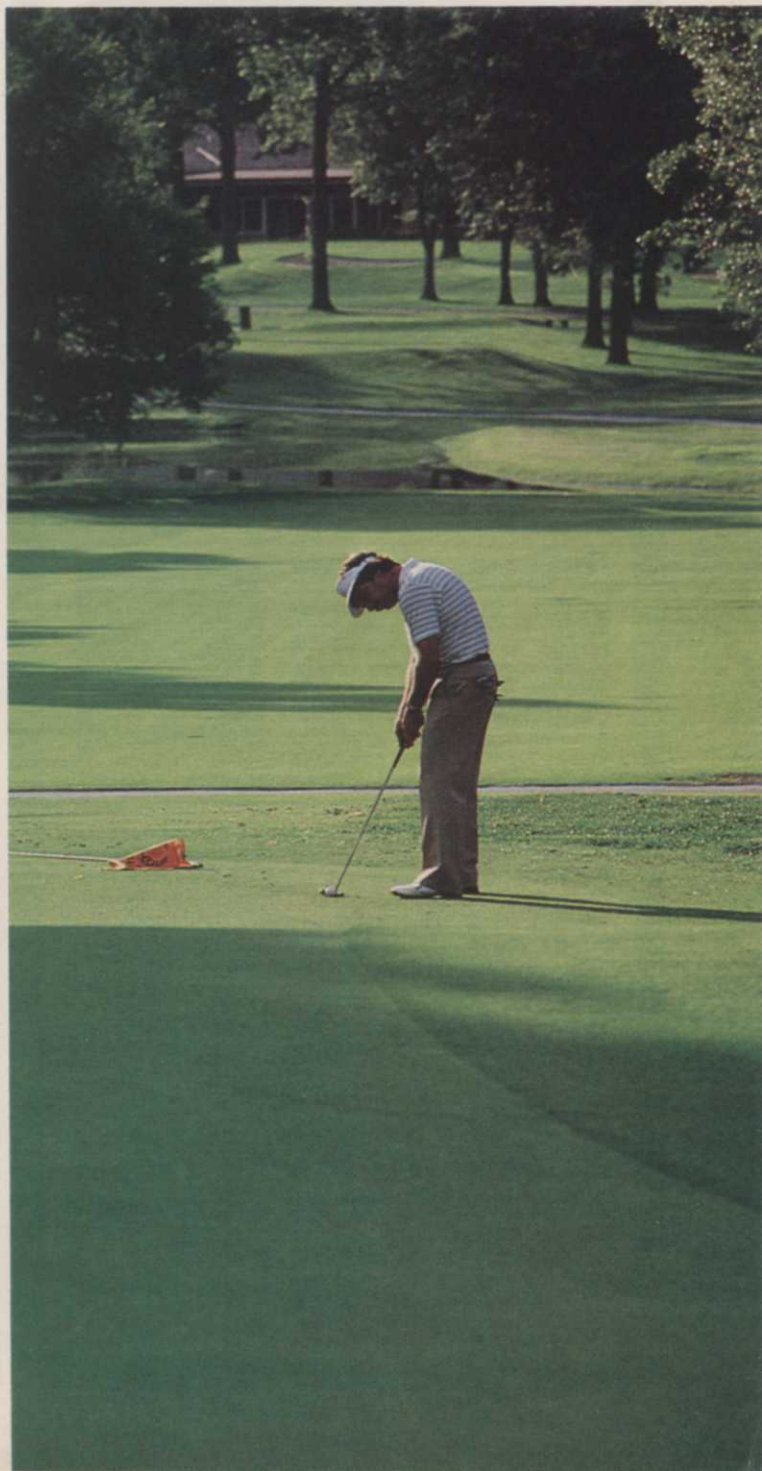

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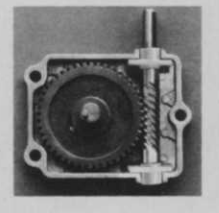

In addition, the T-7 features a virtually unbreakable polyethylene base and canister. All interior exposed parts are made of corrosion resistant stainless steel. And, the T-7 utilizes such "human engineered" features as a lightweight, compact, body-contoured design, see through safety lid, to prevent your breathing in harmful fumes of dust from the canister, and a precision calibrated top-mounted fingertip flow control knob.

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LANDSCAPE UPDATE *from page 85*

Cagwin & Dorward of San Rafael won the interiorscaping award for Santa Rosa Plaza, Santa Rosa. The Achievement Award went to VanderGeest Landscape, Inc., Reseda, for Mid Valley Racquetball Club, Pool Area, Reseda.

The Small Residential Landscape Maintenance award was given to Stay-Green, Inc., North Hollywood, for the Nesen residence, Westlake Village.

The Large Residential Landscape Maintenance award was also won by Stay-Green, Inc., North Hollywood, for the Cooperman residence, Bel Air.

The Small Commercial Landscape Maintenance award was given to Lancaster Enterprises, Costa Mesa, for Countryside Condominiums, Orange. The Achievement award went to Cagwin & Dorward, San Rafael, for Golf Court, Santa Rosa.

The Medium Commercial Landscape Maintenance award went to Mission Landscape Services, Inc., Costa Mesa, for Stonecreek Plaza, Irvine. The Achievement Award was given to Brooker Associates, Inc., Placentia, for Parkview Terrace, Long Beach.

The Large Commercial Landscape Maintenance award was presented to Stay-Green, Inc., North Hollywood, for Security Pacific National Bank, Los Angeles. The Achievement Award went to Brooker Associates, Inc., of Placentia, for Crown Pointe, Long Beach.

Annual Trophy Awards recognize the professional excellence of CLCA's 1200 members statewide. Entries were judged on aesthetic appeal, utility value, quality workmanship and design. CLCA is the nation's oldest and largest organization of professional state-licensed contractors.

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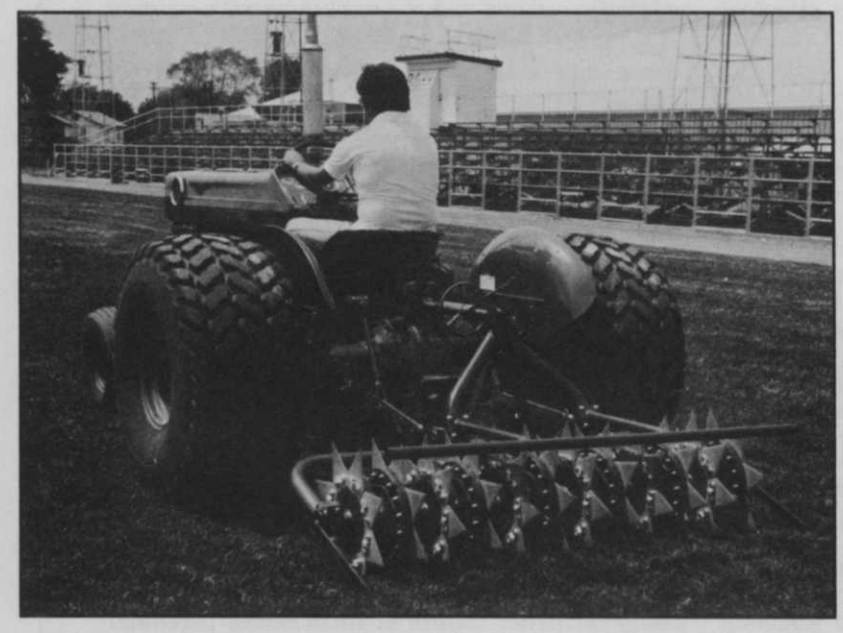

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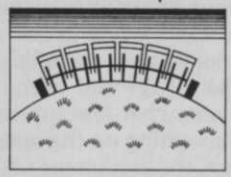
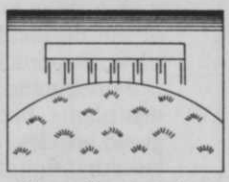


Renovaire's uniquely engineered design provides precise penetration; on both level and uneven ground.



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VEGETATION MANAGEMENT

By Balakrishna Rao, Ph.D., and Thomas P. Mog, Ph.D., Davey Tree Expert Co.

Q: *We are thinking of using Roundup for renovation purposes. We are concerned about its effect of drifting or leaching on nearby landscape plants. Will it cause injury? (North Carolina)*
A: Roundup (glyphosate) is a nonselective, broad-spectrum, systemic herbicide. The isopropylamine salt rapidly degrades in the soil, but is quite resistant to decomposition in higher plants. In recent years, people have used Roundup for lawn renovation purposes and weed control under trees. Roundup is a very useful tool when used as a directed spray.

Often, contaminated desirable plants or areas can be saved from damage by heavy watering to wash off the chemical. This should be done immediately or within three to four hours after exposure. The action of the herbicide will be less in the soil than on the plant. Reports from Minnesota indicate that Roundup is damaging to the foliage and young bark of deciduous plants, but somewhat less injurious to the evergreen species. Depending on the amount of chemical reaching the plant, the symptoms may appear immediately or by the fifth week after exposure.

Symptoms include chlorosis, defoliation, twig dieback, malformed growth and death. In general, the deciduous plants were more sensitive to Roundup than the evergreen species. To avoid these problems, keep Roundup away from desirable plants.

Q: *What is the best way to clean clothing contaminated by pesticides? (New York)*
A: Pesticide-contaminated clothing should be washed daily and should not be mixed with other uncontaminated laundry. Contaminated clothing should be either stored in a plastic bag until washed or put directly into the washing machine soon after removal.

Use hot water (140°F) at full level and the recommended amount of heavy-duty phosphate-based detergent. Dry the clothing in an automatic dryer for thirty minutes at the regular fabric setting. Make sure to remove any leftover pesticide from the washer by running it through all cycles using detergent, but without the clothes.

Reports suggest that this procedure should remove 99.8% of the pesticide from clothing.

Q: *What kind of chemicals would you recommend for renovating an old lawn? I do not like the type of grass species we have in our lawn as it is very susceptible to Fusarium blight disease. (Michigan)*
A: Diseases such as Fusarium blight and Stripe smut are difficult to eliminate once they are established in a lawn. However, with the proper cultural and chemical treatments for Fusarium blight management, the disease incidence can be minimized.

It is also important to either reduce or remove stress factors, particularly moisture stress, which are conducive to the disease development. If the management practice fails to provide satisfactory turfgrass response and quality, then the best method would be to consider total renovation, which would involve killing the existing vegetation and re-establishing with resistant grass cultivars. 'Adelphi,' 'Majestic,' 'Parade,' 'Touchdown,' 'Brunswick,' 'Baron' and 'Cheri' Kentucky bluegrass cultivars have shown better resistance to Fusarium blight. Contact your local extension personnel for cultivar recommendations for Michigan.

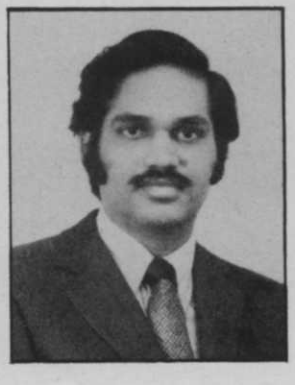
The unwanted vegetation can be best removed by the combination of chemical treatment followed by tilling. Re-establishing new grass cultivars should be timed so that seeding can be done between September 1 and September 15.

Herbicides such as Roundup, Amitrol or Amitrol-T plus dalapon, and Amitrol-T alone are labelled for lawn renovation. In recent years, Roundup is more commonly used for lawn renovation because of its short soil residual which allows seeding and sodding seven days after application.

Roundup is a water soluble, nonselective herbicide that generally controls most green vegetation and causes discoloration in about seven days. A combination of Roundup treatment and tilling gives good control of most grasses. A repeat application may be necessary for better control of rhizomatous perennial grasses.

Q: *Our birch tree has several bumps on the stems. When I pressed one, sap came out. I also found some small holes on the stems, and the tree is defoliating*

Continued on page 104



Balakrishna Rao is plant pathologist and Thomas Mog is pest management specialist for Davey Tree Expert Co., Kent, OH.
Questions should be mailed to Vegetation Management, Weeds Trees & Turf, 7500 Old Oak Blvd., Middleburg Heights, Ohio 44130. Please allow 2-3 months for an answer to appear in the magazine.

WT&T

LETTERS

Golf Green Construction Is Precise Business

In the article on "Soilless Greens" in the December 1982 issue, golf course architect Ron Fream does a good job of presenting generally some of the problems and solutions involved in the construction of golf course greens.

To avoid creating situations which can be disastrous where the amateur in greens construction (even though he might be a landscape architect or golf course superintendent) tries to use Architect Fream's article for constructing greens on a new course or reconstructing greens on an old course, I hasten to elaborate on his article and offer this constructive criticism.

One of the problems of this profession is that "everyone's an expert," including many golf course superintendents and nurserymen, as well as members of green committees at country clubs. "I read an article, and this is how you do it!"

First of all, no one should attempt to use a seedbed mixture that has not been tested by the United States Golf Association - Green Section's approved testing laboratory. The address of this laboratory can be obtained through the U.S.G.A. office at Far Hills, New Jersey. These tests will indicate the porosity-capilarity relationship of the proposed mixture, the moisture retention of the mixture, the bulk density, and other factors necessary for the scientific decisions in making a good seedbed mixture. Unfortunately, this recommendation was left out of Architect Fream's article.

There are some pitfalls to be avoided in greens construction work which were not mentioned in Fream's article, possibly for lack of space. For example, the use of the sand he recommends could result in percolation rates of from 15 inches to 40 inches per hour, which is considerably beyond the recommendations of the U.S.G.A. calling for a minimum of 3 inches per hour and a maximum of 10 inches per hour for most greens. Loading the sand with additional organic material, such as going from the 20% normally recommended by the U.S.G.A. Green Section to the 30% indicated in this article, might slow down the percolation rate but possibly at the expense of increased danger of disease due to the high organic content of the green. And when the organic material eventually "burns out" by decomposition, the green might be left with an exceptionally high percolation rate.

High percolation rates are often very acceptable in the eastern part of the United States or along the gulf coast where humidity is high. Another factor to be considered is the wind velocity. With high humidity and low wind velocity, such as found often in the southeastern and middle Atlantic states, the rate of moisture removal from the seedbed by evaporation is greatly reduced. But in the midwest and western parts of the United States where humidities are lower and wind velocities are higher, the use of sand and organic material only often results in an excessive percolation rate and can mean very drouthy greens, unless excessive maintenance costs are used in syringing, watering, and fertilizing. Both money and water are getting to be scarcer these days, and labor isn't getting cheaper.

So, while greens with percolation rates of 10 inches to 30 inches per hour based on pure sand and organic material,

Continued on page 94

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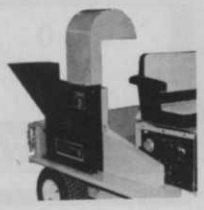
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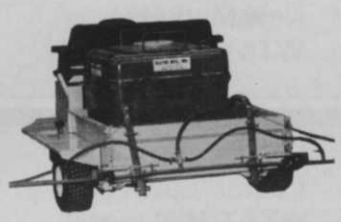
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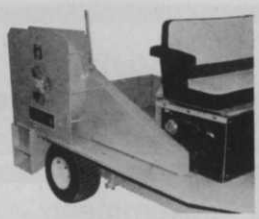
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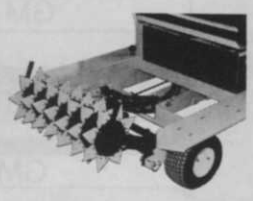
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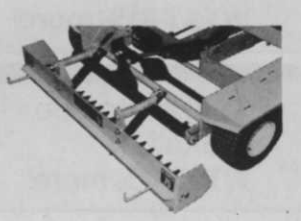
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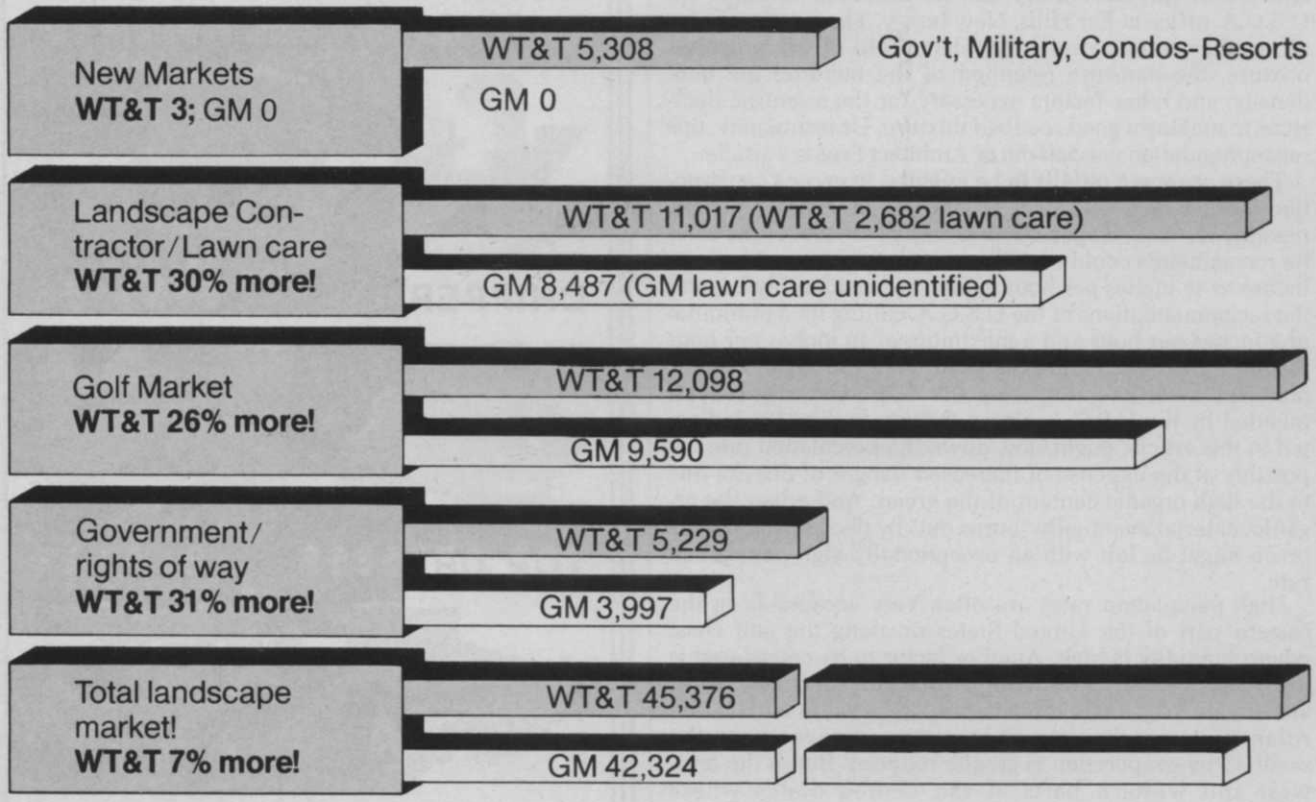

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EVENTS

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Associated Landscape Contractors of Massachusetts and the Cooperative Extension Service of the University of Massachusetts Annual Exposition, Glen Ellen Country Club, Millis, MA. **March 1-9.** Contact ALCM, 1357 Washington St. #7, West Newton, MA 02165 964-0452.

Horticultural Industries Conference, University of Minnesota, St. Paul, MN. **March 2,3,4.** Contact Office of Special Programs, (612) 373-0725.

USGA Green Section Regional Conference (North Central), St. Paul, MN. **March 8.**

Club Managers Association of America Annual Conference, Ceasar's Palace, Las Vegas. **March 13-15.** Contact CMAA, 7615 Winterberry Place, Bethesda, MD, 20817. (301) 229-3600.

Annual Canadian Turfgrass Show, Edmonton Inn, Edmonton, Alberta, Canada. **March 13-16.** Contact Canadian Golf Course Superintendents Association, 698 Weston Rd. Suite 32, Toronto, Ontario M6N 3R3, (416) 767-2550.

Maine Turf Conference, South Portland Merry Manor. **March 16-17.** Contact Dr. Vaughn Holyoke, Deering Hall, University of Maine, Orono, ME 04469, (207) 581-2111.

Sixth Turf Conference and Equipment Show and Service Clinic. Waukesha Co Exposition Center, Waukesha, WI. **March 16-17.** Contact Reinders Bros. Inc., Ed Devinger, Turf Division, 13400 Watertown Plank Rd., Elm Grove, WI 53122. (414) 786-3300.

USGA Green Section Regional Conference (Southern) Ft. Lauderdale, FL **March 17.**

74th Annual Mississippi Valley Conference of State Highway and Transportation Department, Hyatt Regency Hotel, Milwaukee, WI. **March 21-24.** Contact Harvey Shebesta, District Director, Wisconsin Dept. of Transportation, 310 South West Ave., PO Box 649, Waukesha, WI 53187 (414) 548-5681.

Cooperative Extension Service, Ohio State University, Brooklyn Heights City Hall, 345 Tuxedo Ave., Cleveland, OH. (216) 631-1890. **March 24.** Fred Buscher, "Planting: Balled & Burlapped, Containers, Materials;" Nick Stephin, "Common Diseases and Plant Physiology of Ornamentals;"

ALCA Student Field Days, Richland College, Dallas, TX. **March 25-27.** Contact Dept. of Landscape Architecture, Mississippi State University, Briscoe Hall, PO Drawer MX, Mississippi State, MI (601) 325-3012.

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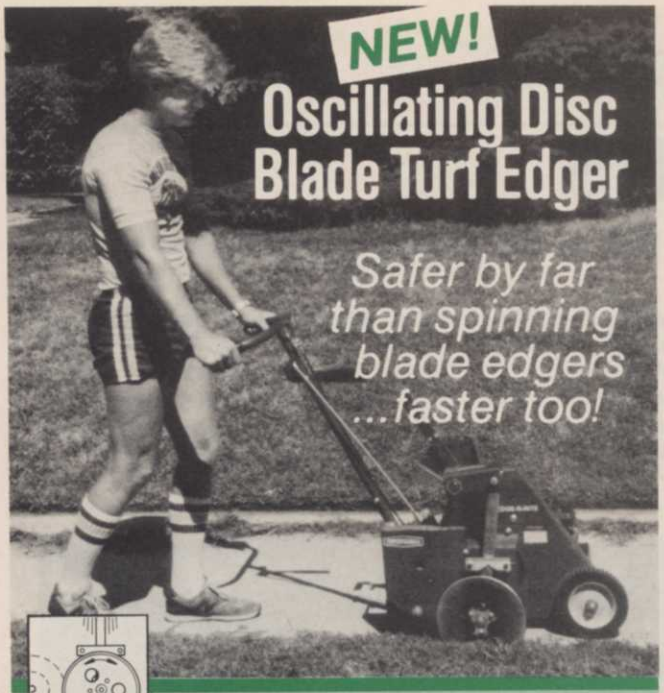
such as peat, might be acceptable in certain parts of the southeast, those same greens could be a real problem in Kansas, West Texas, or the mountain states. For example, while we have no objections to greens with percolation rates of between 6 inches per hour and 10 inches per hour in the east, we try to keep our greens on the lower side of the U.S.G.A. recommendation, namely in the 3 inches to 5 inches per hour range, when building greens in drier, windier climates. But you won't know what your percolation rate is unless you have the mixture tested!

To accomplish the lower percolation rate normally means the incorporation either of fine sands or the incorporation of native soils, or calcined clay fines, should they be available and economical. "Uniformly dirty" sands are just not usually available. We like the calcined clay fines for the simple reason that they are non-plastic, are easily mixed, have a good moisture retention capacity, and have ion-exchange capability. Although some agronomists do not like the use of calcined clay in any form, Dr. Bill Daniel at Purdue has had excellent results in the use of this material based on his research going back to 1956. And we have had excellent results with it on many courses.

Another very important matter to watch out for, and not covered completely in Architect Fream's article, is the quality of the organic material being use. Many products on the market, and some natural products which unfortunately get mixed with the soil on which they are deposited, have a high clay and silt content themselves. Or they may have a very high ash content. Other materials, such as lignitic material, or "muck" have particle sizes so small that they can actually be detrimental to the mixture and plug up the pores



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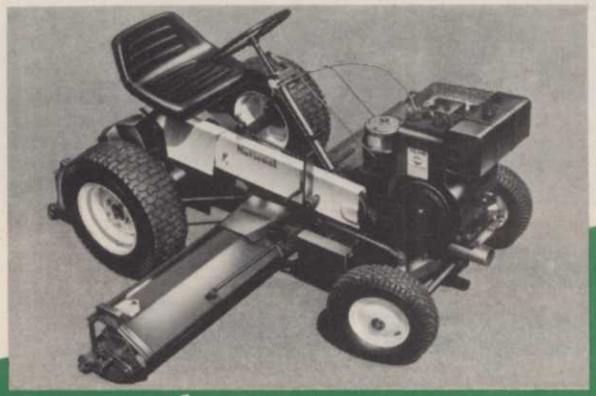

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of the seedbed worse than clay or silt. The plugging action is not so much from a particle size standpoint, but by having a specific gravity lower than one, they are easily floated to the surface to form a barrier. We have seen organic materials offered on the market which were less than 50% organic, as determined by laboratory ignition loss. We urge that the organic material used for greens construction have an ignition loss of at least 90%.

And the argument over "on-site" versus "off-site" mixing will go on for some years yet. The U.S.G.A. recommends only off-site mixing so that "great homogeneity" can be obtained. We have found that you can have as many problems with off-site mixing as you can with on-site, particularly if the operator mixing off-site is not careful and mixes topsoil from underneath the stack with the seedbed itself. A paved surface for mixing is usually not available. "On-site" mixing has its place, particularly when one is trying to mix one part of material A into four parts or six parts of material B. Careful rototilling of A into the top 5 or 6 inches of B, and checking the degree of mixing, can product excellent results on putting greens.

The problem with on-site mixing comes when people try to mix one part of material A with one, two, or even three parts of material B. But when the major material to be mixed is sand, and the minor material being mixed in is either calcined clay fines, peat, or other organic materials, and you're only using up to 20% of these organic materials, it's pretty difficult to go wrong if the rototilling is reasonably thorough. The savings to be obtained are great, as you do not have to put the same expensive additives in the bottom six inches,

Continued on page 98

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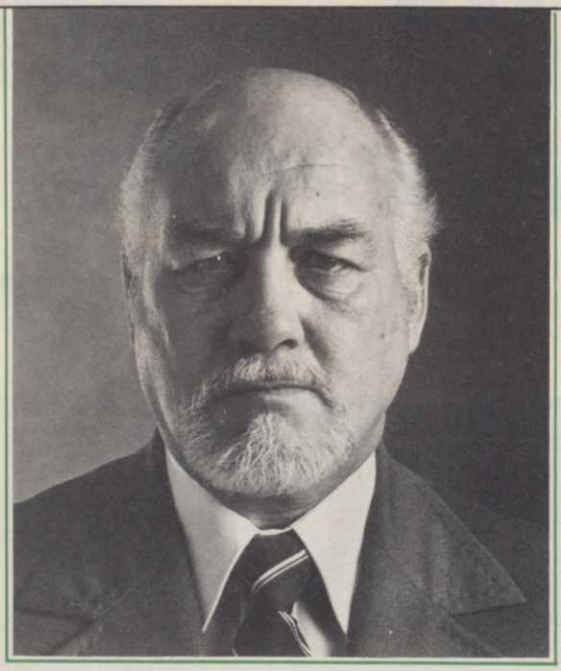

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the goosegrass goes.

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Circle No. 104 on Reader Inquiry Card

where it generally is fairly inert anyhow.

Some of the best agronomists I have talked with agree that the major portion of turf control on greens is in the top three inches to four inches, and what is down below that is relatively unimportant as long as it drains. Excessive drainage is undesirable, as some capillarity must be available for "feedback" of water from the perched water table to the roots of the plant above.

I fully agree with Architect Fream that one of the most important matters in the future maintenance of greens is the topdressing. Topdressing materials should be the same as the initial mixture for the greens. Any change should only be done after consultation with experts in greens construction, such as the U.S.G.A. Green Section. We can often tell exactly when the green committee or the superintendent was changed by looking at the profile of greens which have been in existence for six to twelve years or more.

In short, the proper construction of golf greens is a matter of both aesthetics, the game of golf, engineering, and a very special agronomy. It is not a job for ordinary landscape architects, golf course superintendents (who might have the agronomy expertise but not the design expertise), or even touring pros, who might know the game of golf but not know the agronomy! This is where the golf course architect, in conjunction with the Greens Section arm of the U.S.G.A., should have control.

I trust your readers understand this.

Joseph S. Finger, P.E.
Golf Course Architect
Houston, TX 77040

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PRODUCTS

Utility backhoe is for Model 6510

Ditch Witch has made available a utility backhoe for its Model 6510 underground construction equipment. Model A620 can dig to depths of 109 inches, has a 180 degree swing arc and reach of 154 inches. The backhoe mounts on the front of the vehicle; the rear can employ either a trenching module, vibratory plow module or combination of both.

Circle No. 175 on Reader Inquiry Card

No stakes left above ground

Duckbill earth anchors from Foresight Industries are made of a lightweight aluminum alloy and hold up to 10,000

times their weight. Used to anchor trees, sheds, fences, bins, towers, tents, scaffolding, winch anchors, retaining walls, picnic tables, playground equipment, embankment tiedowns and other equipment, Duckbill anchors can be installed quickly with ordinary tools. They do not involve stems, rods or pipes so no stakes are left above ground to cause damage or injury.

Circle No. 176 on Reader Inquiry Card

Designed for high maneuverability

Bolens Corp.'s Articulator has a pivoting frame to cut around trees, fences and shrubs. The frame steer rear en-

Continued on page 102

Forecast Lasting Spring Choices

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- Over 60 distributors assure nationwide availability.

AND BEST OF ALL Milorganite promotes excellent turfgrass color and density wherever you may be. This has been proven in service to the turf industry since 1926.

Milorganite®

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735 N. Water Street
Milwaukee, WI 53202

Circle No. 133 on Reader Inquiry Card

Does anyone manage finances more adeptly than a turf manager does?

So they claim.

Pennfine Perennial Ryegrass covers more ground than any other turfgrass variety in the world. This message recognizes the people who made it happen.

For your free full-size (22" x 28") poster of this ad, send your name and address to:
Pennfine Poster #2, P.O. Box 923, Minneapolis, MN 55440. (Watch for the other five ads in this series.)

Circle No. 148 on Reader Inquiry Card

gine rider features a front mounted 42 in. mower, an 11 hp engine, automotive muffler, spring mounted seats and wide turf tires. Cutting heights are adjustable.
Circle No. 177 on Reader Inquiry Card

Cutting deck lifts hydraulically

Cushman Front Line is an 18-hp mower with 60- and 72-inch cutting decks constructed of 12-gauge carbon steel, reinforced and arc welded to withstand difficult cutting assignments. The engine is an OMC 18-hp twin, air-cooled, four-cycle with a hydrostatic transmission and multi-disc PTO clutch. An optional diesel is available. Forward speeds up to 7.7 mph and reverse speeds up to four mph are possible, and the mower has direct drive to the deck gear box and a sealed and lubricated telescopic drive shaft for greater durability and longer life. Optional components for snow removal and sweeping are also available.
Circle No. 182 on Reader Inquiry Card

Diesel tractors in three models

Allis-Chalmers' Simplicity Manufacturing Co. has three tractors available in two and four wheel drive models with two-cylinder, water-cooled engines. All have 12 forward speeds and three reverse speeds from three speed ranges. Standard equipment includes hand and foot accelerators, retractable drawbars, 12-volt batteries, hydraulic position control and single stage clutches. Many attachments and optional equipment are also available.
Circle No. 183 on Reader Inquiry Card

Hitches are interchangeable

Grandy Co. 30-inch and 24-inch width lawn spreaders now have optional tractor hitches interchangeable with

current push handles. The spreaders also have a shutoff reachable from the tractor, and optional jigglers to reduce bridging for spreading dry lime.
Circle No. 184 on Reader Inquiry Card

User-safe post-emergence control

Lakeshore Equipment and Supply Co. is marketing two new Dicamba Plus 2,4-D combinations. Lesco eight-one and ten-one selective herbicides provide highly-effective, cost-efficient post-emergence control of selected broadleafs. The combinations give equally fine control when used with other pesticides.
Circle No. 185 on Reader Inquiry Card

Mower is equipped with three blades

Kubota Tractor's mid-mount mower, equipped with three blades capable of cutting a 60-inch path, is designed for use with two- and four-wheel drive models of their B-8200 tractor. The RCB60-1 mower features three adjustable anti-scalp rollers and a special

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Circle No. 119 on Reader Inquiry Card

pantograph linkage mechanism with four suspension points for smooth carriage over uneven terrain. A guage wheel can adjust cutting height at half-inch increments from 1.5-4 inches.
Circle No. 186 on Reader Inquiry Card

Split-blade cutting increases efficiency

Brouwer Turf Equipment's sod cutter Model 10 features a 13 inch width of cut and ½ inch to 1-½ inch depth of cut. The 195 lb. cutter requires a 5 hp

engine for low fuel consumption and reduced operating costs, and has folding handles and kick stand for easy and stable transporting and storage. The split-blade cutting concept reduced vibration and increases traction.
Circle No. 178 on Reader Inquiry Card

No gears, motors or cams

Toro Co.'s Irrigation Division introduces a series of four solid state controllers that provide accurate, trouble-free control for automatic sprinkler

systems. All four have digital readouts, 0-60 minute timing per station with up to three start times, and timing accurate to one minute per month. Operation can be manual or automatic, and a rechargeable battery back-up assures programming protection.
Circle No. 179 on Reader Inquiry Card

Controls turf insects without chemicals

J.& L. Adikes, Inc. adds to its list with All Star perennial ryegrass. The variety is said to have a resistance to Sod Webworm and to Chinch bugs. It also has good rust resistance, is early maturing, gives reasonably good yield and has little or no flourescence.
Circle No. 180 on Reader Inquiry Card

Jacobsen offers redesigned mower

Jacobsen Div., Textron Inc., presents a redesigned, mid-sized three-reel riding mower that mows up to 33 acres in one shift. Available in 76-in. or 84-in. cutting widths, the mower features a 14-hp electric-start, air-cooled engine. With a cooler operating hydrostatic transmission separate from the transaxle, the unit has a larger vertical oil filter and a cooler.
Circle No. 181 on Reader Inquiry Card

Weather-matic

Reliability is the hallmark of Weather-matic lawn and turf irrigation systems. Every valve is pressure-tested before it leaves our factory. Every sprinkler head is designed for years of trouble-free operation. Every controller is durable, dependable and accurate. They're all designed to work together, so you can install a Weather-matic system — and forget about costly callbacks and repairs for years to come.

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Circle No. 166 on Reader Inquiry Card

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Brown Patch*
Red Thread*

*Approval Pending

excellent. If you want a Cadillac, Everett's book may be your favorite.

When a scientist devotes as much of his energy and life to a publication as Everett has, it is very difficult to criticize. But $500 is a considerable amount of money and practical decisions have to be made. **WTT**

VEGETATION MGMT. *from page 88*

from the top downward. What causes this, and can you please suggest some control methods for this problem? (New York)

A: From the symptoms you describe, the birch has been attacked by the bronze birch borer. This is a very serious problem and occurs wherever birches are grown. Borer control is difficult because they are normally below the bark and in a protected site in the tree.

There are no reports indicating any association between the water blisters (bumps you mentioned) and bronze birch borer infestation. If you have seen any lumpy bark on the trunk, it would be an external indication of bronze birch borer activity. Generally, the birch trees which have survived borer attack develop these conspicuous swollen areas as a result of their healing process. The holes and tip dieback symptoms also suggest bronze birch borer injury. The exit holes made by the adult beetle are typically "D" shaped.

NY Botanical Encyclopedia Falls Short on Care

The ten volumes of The New York Botanical Garden Illustrated Encyclopedia of Horticulture are as complete as NYBG's world famous plant collection. Senior Horticultural Specialist Thomas Everett has devoted 12 years to the project published by Garland Publishing Inc.

The $525 price tag for the series puts this reference into a "Franklin Mint" category. No doubt the appearance alone of the ten green volumes side by side on a library shelf make this attractive to many horticultural professionals and libraries.

The content is well-illustrated with drawings and both color and black and white photography. This work goes beyond the term comprehensive in the variety of plant material included, but it falls short on practical maintenance suggestions. Everett appears to have written the book more for the sophisticated hobbyist rather than the professional. Considering the experience of Everett, much more could have been added for the professional.

No doubt this publication will be compared by many professionals with Wyman's Gardening Encyclopedia which sells for $29.95. Parts of Wyman are noticeably out of date, but overall its value to the professional is not significantly less than Everett's Encyclopedia. If money is a consideration, Wyman's is still

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Chinch Bugs
Sod Webworms
Billbugs, Grubs and
Many Other Insects

scales. Obscure scale is difficult to control, generally requiring more than one year's effort.

Obscure scale is primarily a southern pest, but is active also in the mid-Atlantic states. It has been found from Massachusetts to Florida, and west to Texas and California.

To manage obscure scale the following procedures are recommended:
1) Sanitation. Prune out dead, dying and heavily infested branches. 2) Sprays. Apply dormant oil and follow-up with insecticide sprays during the crawler stage; approximately mid-July for the red oak group and mid-August for the white oak group. 3) Fertilization. The trees should receive proper fertilization and water during dry periods to reduce stresses induced by scales and drought.

Q: *What can I use to control aphids that are feeding on the bark of my pines? I have tried malathion, but did not obtain good results. (Michigan)*
A: Your "aphids" are probably adelgids, which taxonomically different from the small, sucking insects we commonly call aphids. True aphids belong to the family Aphidae and can be controlled with organophosphate insecticides such as malathion or diazinon. The conifer bark aphids belong to the family Adelgidae and, as you mentioned, are not very susceptible to the organophosphates.

Carbaryl (Sevin), a carbamate, is effective against adelgids. Some studies have found a build-up of mites on trees repeatedly sprayed with carbaryl. Adding a miticide, such as Kelthane, should control the mites. **WTT**

The new, expanded Dursban 2E label includes the use of Dursban against wood-boring insects infesting shrubs and trees. Ohio State University is now recommending that Dursban be substituted for lindane for bronze birch borer control programs. Insecticides should be sprayed just prior to first adult emergence in June and twice more at two-week intervals.

Generally, this problem occurs on weakened plants. Therefore, keep the plant under good care with proper fertilizing and watering as needed.

Q: *It seems to me that many of the oaks around the Louisville area are dying. I have looked at several trees and did not see anything unusual. Is there something new attacking oaks in our area? (Kentucky)*
A: Within the last year, I have not seen anything in print which mentions a new pest or disease problem affecting oaks in Kentucky. However, our people have reported that more oaks than usual are dying in and near the Louisville area.

Upon examination, many of the affected oaks were found to be infected with obscure scale (*Melanaspis obscura*); so named because of its small size and gray color, which blends with the color of the bark.

Trees that look weak, have dead or dying limbs and show general decline symptoms could have this problem. Detection requires close examination, a trained eye and/or a 10X hand lens.

The scales tend to crowd together and stack on top of each other, forming a "crust" on the bark. Frequently, the bark is depressed or sunken where clusters of these insects have been sucking sap from the inner bark (phloem). Young scales are often found beneath several older, usually dead,

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Going out of business sale, 1978 GMC Sierra 6000, with 1200 gallon Tuflex tank, has 50 gallon saddle tank. FMC 10 gpm. pump, Hanney electric hose reel, with 400 ft. ½ in. id. hose, also detachable side mount boxes for dry applications. Two FMC Royalette 1010 series sprayers, Scott RX rotary spreaders, spray guns, pumps, hand cans, much other misc., all equipment in excellent condition. Call Greg for info. (312) 293-1036. 3/83

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Used—Jacobsen F10, 7 gang, 5 blade blitzer mowers, semi pneumatic tires, $6,800.00. Call (616) 887-7301. 3/83

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NEW and USED EQUIPMENT Hi Ranger and Asplundh Forestry bucket trucks, Asplundh and Chipmore wood chippers, Stump Grinders, Log Splitters, Crane Trucks. Mirk Inc. (216) 669-3567 (216) 669-3562, 7629 Chippewa Road, Orrville, Ohio 44667 TF

BEAN 100 ROTO-MIST FOR SALE—Complete unit mounted on 1971 F350. Price $9,800.00. 516-423-0090. 3/83

Vermeer TS-44 Tree Spade. Complete system ready for mounting on your truck. 4-Golf Course type tractors with turf tires $2750.00 ea., some have hydraulic mowers. Ford 4500 diesel tractor loader backhoe $5900.00. (312) 438-5101. 3/83

For Sale: 23,560 ft. wade-Rain alum. Pipe 2"x40' at 50 cents per ft. 7800 ft. wade-Rain alum. Pipe 3"x40' at 65 cents per ft. 50 Buckner 3" electric valves with hookup for 2" and 3" alum. pipe, $100.00 each. Jacobsen F-133 mower less engine but has 5 extra mowing units—excellent shape, $1750.00. Brouwer Sod Cutter in good condition, $12,000.00. Schubert Sod Farm, Calhan, CO 80808, 1-303-683-2262. 4/83

TREE SPRAYER for sale. 500 gallon tank, 40 gallon per minute pump, excellent condition. For information call Horizon Estates Landscape Co., Franklin Lakes. New Jersey. (201) 891-9356. TF

HYDRO-MULCHERS AND STRAW BLOWERS. New and used. Southwest Hydro-Mulchers, 3220 S. Jupiter Rd., Garland, Tx. 75041. (214) 840-2440 (Tx.), (800) 527-2304 (except Tx.) TF

HELP WANTED

MANAGEMENT—Landscape Construction firm based in Southwest location is seeking self-motivated individual for management position. The right individual should have good business management skills and knowledge in all facets of Landscape Construction. Excellent career opportunity with good pay and benefits. Only qualified individuals need reply. Send resumes to WTT Box 315. 3/83

GREENS SUPERINTENDENT: 18-hole US Army Golf Course Heidelberg, West Germany. Good salary, free housing and utilities, PX and Commissary privileges. Moving cost paid for. Contact Club Manager at 06202-3167 (Heidelberg, Germany) or send job application on Federal Form SF 171 to Heidelberg Golf Club, APO NY 09102. 3/83

Landscape Maintenance: Career potential for take-charge person. Minimum of two years experience a must. Salary negotiable. Send complete resume and references to Mid-Atlantic Landscape Development, Inc. Post Office Box 844, Lanham, Maryland 20706. 3/83

LANDSCAPE MAINTENANCE MANAGER—For well established Houston firm. Related degree and work experience required. 606 Delz, Houston, TX 77018. 713-691-5460. 3/83

Chemical Lawn Care Company needs General Manager with at least three years experience with a national or regional lawn care company. Experience must include sales, and customer and employee relations. Salary open. (214) 690-1051, Layson, Inc., P.O. Box 30121, Dallas, Texas 75230. 3/83

General Manager position open for chemical lawn and shrub division of established landscaping company in the sunbelt area. Tremendous opportunity for an aggressive individual having experience with a national or regional lawn care company. We are looking for a BUSINESSMAN—the very BEST!! Knowledge of turf grass, ornamental plants, and marketing needed. The right person will enjoy excellent salary, benefits, and opportunity for equity participation with unlimited earnings potential. Send complete resume including education, experience, and salary history. All replies will be kept confidential. Write WTT Box 313. 3/83

Landscape maintenance supervisor. Large established commercial maintenance contractor has immediate opening for an area supervisor to manage and develop commercial, industrial and public work maintenance programs, and must have experience including pest control and estimating. Excellent growth potential. Salary commensurate with experience. Send resume to Mickey Strauss or Gary Peterson, American Landscape Maintenance, 7949 Deering Avenue, Canoga Park, CA 91304. 213-999-2041. 3/83

SOD FARM MANAGER—500 acre Chicago-area operation seeks qualified manager. Involves production, irrigation, and harvesting. Excellent salary and benefits. Send resume to WTT Box 314. 4/83

Landscape Supervisor, Salesman, Maintenance Supervisor, Irrigation Manager. Experience essential for a position with fast growing operation in Massachusetts. Must be aggressive and willing to work. Send resume to: Duxbury Gardeners, Inc., 650 Tremont St., Duxbury, MA 02332. 3/83

MISCELLANEOUS

BALL BARRIER NETTING: Made of Olefin fibers. 6½ feet and 25 feet high. Strong and tough. Will not rust. Easy to handle. For Driving Ranges and Golf Courses. Keep golf balls from straying off-course. J.A. Cissel Co., Inc., Dept. JK, P.O. Box 339, Farmingdale, N.J. 07727. (800) 631-2234. 4/83

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KELWAY® SST, new professional **SALINITY TESTER** using microchip technology, retails under $90,00. Eliminates soluble salts problems by telling when to leach or fertilize. Available from distributors. Brochure from **KEL INSTRUMENTS CO., INC.,** P.O. BOX 1869, Clifton, N.J. 07015, (201) 471-3954. 5/83

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POSITION WANTED

GROUNDS MAINTENANCE/LANDSCAPE SUPERVISOR—Seeks challenging position. Schooling, field application in landscaping, design and maintenance. Resume upon request. Jack Pingree, 303 Old Oak Rd., Newark, Delaware, 19711. (302) 731-4082. 8/83

WANTED

Wanted—Princeton Tow-Boy Sod Harvester & Princeton Piggy Back Forklift, Call (815) 633-7900. 3/83

WANTED—Used Toro Parkmasters—any year, any condition, any quantity, B&M Leasing, P.O. Box 172, Williamstown, New York 13493, (315) 675-8293. 5/83

EDUCATIONAL OPPORTUNITIES

LANDSCAPE AND TURFGRASS MANAGEMENT: Obtain the expertise to start and/or manage a landscaping or lawn care business. For information on our two year program contact the Institute of Applied Agriculture, University of Maryland, College Park, Maryland 20742 (301) 454-3938 4/83

START YOUR LANDSCAPING CAREER NOW! Write: School of Landscape Design and Sales, Lake City Community College, Rt. 7, Box 42, Lake City, Florida 32055. Fully accredited and V.A. approved. 8/83

ADVERTISERS

Reader Service Number		Page No.
	Adelphi Kentucky Bluegrass	37
101	The Andersons	82, 83
102	Barebo, Inc.	25
103	BFC Chemicals, Inc.	53
104	Brouwer Turf Equipment Ltd.	98
106	Champion Brass Mfg. Inc.	49
107	Chevron Chemical Co.	61
219	Ciba-Geigy Corp.	38
109	The Clapper Co.	83
110	Conwed Corp.	20
111	Cushman	42, 43
112	Cushman	63
113	Davey Tree	99
114	John Deere & Co.	CV 4
115	Diamond Shamrock/Ag Chem Div.	86
116	Dow Chemical U.S.A.	CV 2, p. 1
117	Elanco Products Co.	84, 85
118	Polaris E-Z Go	23
119	Four Star Agricultural Services	102
120	Clifford B. Hannay & Son	80
121	Herd Seeder Co., Inc.	98
122	Hoffco, Inc.	59
123	International Harvester	11
124	Irri-Trol Mfg., Inc.	41
125	Jacklin Seed Co.	95
126	Kalo Agricultural Chemicals	65
127	Kubota Tractor Corp.	7
128	Kut-Kwick	55
129	Lofts Seed Inc.	3
130	Lofts Seed Inc.	81
131	Mallinckrodt, Inc.	104, 105
132	Master Manufacturing Co.	95
133	Milwaukee Metro. Sewerage District	100
134	Mobay Chemical Corp.	26, 27
135	Mobay Chemical Corp.	56, 57
136	Mobay Chemical Corp.	96, 97
137	Mobay Chemical Corp.	CV 3
138	Monsanto Co.	4, 5
140	Mud Cat	84
141	National Mower/Turfco	94
142	Northrup King	67
143	Northrup King	9
144	Northrup King	73
145	Olathe Manufacturing, Inc.	89
146	Oregon Tall Fescue Commission	85
148	Pennfine Perennial Ryegrass	101
149	Ransomes	50, 51
150	Rhone-Poulenc, Inc.	12, 13
151	Rhone-Poulenc, Inc.	68, 69
152	Ryan Turf-Care Equipment	87
153	Rugby Kentucky Bluegrass	21
154	Solo Inc.	108
155	Spraying Systems Co.	94
220	Stauffer Chemical Co.	45
158	Toro Co.	33
157	Toro Irrigation Div.	79
159	Tuco Agricultural Chemicals	15
160	Tuflex Manufacturing Co.	80
161	Turf Vac Corp.	19
162	Turf-Seed, Inc.	77
163	Union Carbide Agricultural Products	31
169	Waldon, Inc.	93
164	Warren's Seed-Special Products Div.	47
165	Warren's Turf Nursery	86
166	Weather-matic, Inc.	103
167	Wells Cargo, Inc.	20
168	Wheel Horse Products	28

NEW PRODUCTS

Reader Service Number		Page No.
175	Ditch Witch	100
176	Duckbill	100
177	Bolen Corp.	100
178	Brouwer Turf Equip.	103
179	Toro/Irrigation	103
180	J & L Adikes	103
181	Jacobsen Div., Textron	103
182	Cushman	102
183	Allis-Chalmers	102
184	Grandy Co.	102
185	Lakeshore Equip.	102
186	Kubota Tractor	102

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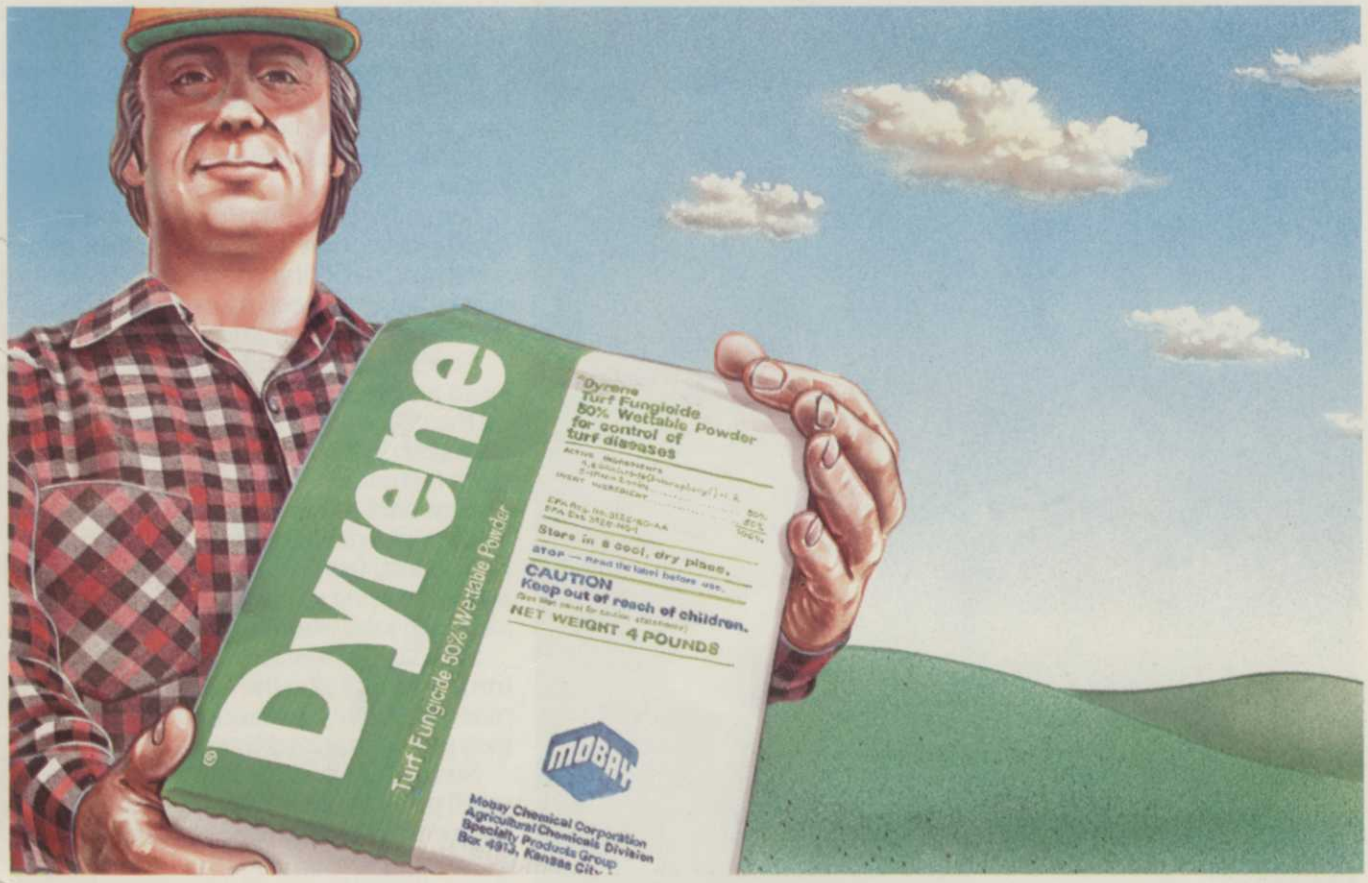
Using DYRENE for fungus disease control is the smartest thing you've always done.



You know ®DYRENE Turf Fungicide gives you effective control of the various species of Helminthosporium which cause diseases known as melting-out, going-out, and leaf spot.

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Circle No. 137 on Reader Inquiry Card

How John Deere makes it easy to choose the best mowing tractor.

Although the new 20-hp 420 Lawn and Garden Tractor and 17-hp 650 Compact Utility Tractor have a lot in common, it's not too difficult to choose the one that best suits your needs.

Because as similar as they are in mowing capabilities, you'll find they're designed quite differently. So choosing between them is largely a matter of deciding what you need in a tractor.

If you'd prefer a gasoline engine, choose the 420. Or if you're already using diesel fuel, you'll probably want the 650. Both tractors have fuel-efficient 2-cylinder engines.

For easy operation, the 420 features hydrostatic drive. It lets you control travel speed and direction with one lever. An easy-shifting 8-speed transmission on the 650 has a built-in shuttle shift.

Check standard and optional equipment. Front and center PTO drives are standard on the 420, while a rear 540-rpm PTO is standard on the 650. A Category 1 3-point hitch is standard on the 650; a Category 0 3-point hitch is optional on the 420.

A standard differential lock, optional mechanical front-wheel drive and optional power steering make the 650 well-suited for tough jobs where traction is a problem.

Standard power steering and a 26-inch turning radius give the 420 outstanding maneuverability. A standard differential lock provides added traction if needed.

No matter which tractor you choose, you'll get John Deere quality and human engineering in a compact package. Plus a choice of center- and rear-mounted mowers and dozens of capacity-matched attachments for a variety of jobs.

For the name of the nearest dealer, or free folders on the 420 and 650 Tractors, call 800-447-9126 toll free (Illinois 800-322-6796) or write John Deere, Dept. 50/67, Moline, IL 61265.

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